The Welding Engineer

Founded by L. B. Mackenzie, 1916

AUGUST, 1925 VOL. 10, No. 8

$3.00 per year in U. S. 608 S. Dearborn St., Chicago, Ill. Reg. U. S. Pat. Office $4.00 per year abroad

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Buy Your Oxygen On Quantity Production Basis

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The Purest Oxygen Is Always the Most Economical

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With the same volume of Oxygen, same pressure and same tip—
This cut made with Airco 99.5% Pure Oxygen
This cut made with 99% Oxygen

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IF YOU are a user of Oxweld apparatus, your equipment undoubtedly will be working efficiently, because Oxweld fieldmen inspect it from time to time, make adjustments, and supervise minor repairs.

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Minneapolis	Minnesota
Omaha	Nebraska
St. Louis	Missouri
Tulsa	Oklahoma
Salt Lake City	Utah
Seattle	Washington
San Francisco	California
Portland	Oregon
Los Angeles	California

REGARDLESS of how well oxy-acetylene apparatus is made or how carefully it is used, repairs, replacements and adjustments will be needed if the equipment is to function efficiently day in and day out. In this your oxwelding apparatus is like your automobile.

The automobile makers early learned that repairs for the entire country could not be made at the factory. No owner could afford the delay. Oxweld learned the same lesson, and has already established apparatus repair stations in 20 industrial centers.

Every one of these 20 repair stations is factory supervised and gives Oxweld users quicker and more economical service than would be possible if the apparatus had to be shipped to a distant factory.

When you buy oxy-acetylene apparatus remember that from time to time it will have to be adjusted or repaired and inquire about facilities for this service.

OXWELD ACETYLENE COMPANY

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Oxweld

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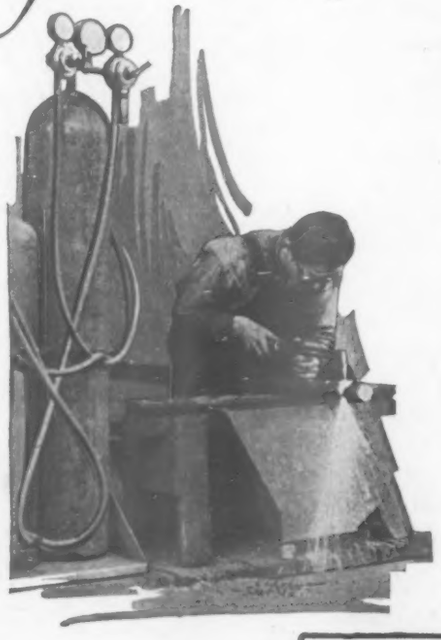

JUNKING broken or cracked machine parts is no longer a popular sport. Today the junk pile itself is very largely "junked", through the use of welding and cutting equipment and the extent to which this can be successfully done depends much upon the kind of equipment used.

Purox torches, operated at prescribed pressures, do not and cannot flash back; thoroughly mix the gases used, and burn them efficiently, economically and effectively.

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If you want to junk your junk pile, you'll want Purox equipment on the job at once. Your jobber or the nearest Purox branch office will be glad to send you a Purox catalogue and price list. Ask for them today.

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Buyers' Index

Readers of The Welding Engineer will find this index to contain the most accurate information obtainable relating to welding apparatus and supplies. The advertising section includes the principal manufacturers of the United States.

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Ideal Face Shield Co.

ASBESTOS INSULATED WIRE AND CABLE
Central Steel & Wire Co.

BLOW PIPES
See "Torches."

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Electric Arc Cutting & Welding Co

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Torchweld Equipment Co.
United States Welding Co.

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Central Steel & Wire Co.
Wm. Cramp & Sons

BUFFERS
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Wodack Electric Tool Corp.

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General Electric Co.
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Shawinigan Products Corp.
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CARBIDE (Compressed in Cakes)
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U. S. Welding Co.

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International Oxygen Co.
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Modern Engineering Co.
Oxweld Acetylene Co.
Purox Co.
Superior Oxy-Acetylene Machine Co.
Torchweld Equipment Co.
U. S. Welding Co.

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Wm. Cramp & Sons

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Allan Mfg. & Welding Co.
Electric Arc Cutting & Welding Co.
General Electric Co.
Lincoln Electric Co.
Mattice Engineering Co., Inc.
National Carbon Co.
Todd Shipyards Corp.
Westinghouse Elec. & Mfg. Co.
Wilson Welder & Metals Co.

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M. Keith Dunham
Wm. Wharton Jr. & Co.

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Wodack Electric Tool Corp.

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General Electric Co.
Lincoln Electric Co.
Mattice Engineering Co., Inc.
H. E. Steinbock
Todd Shipyards Corp.
Westinghouse Elec. & Mfg. Co.
Wilson Welder & Metals Co.

ELECTRODES (Carbon Arc Welding)
See "Cutting Electrodes"

ELECTRODES (Metallic Arc Welding)
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Chicago Steel & Wire Co.
Wm. Cramp & Sons
Electric Arc Cutting & Welding Co.
General Electric Co.
Lincoln Electric Co.
Mattice Engineering Co., Inc.
Manganese Steel Forge Co.
Morris-Wheeler Co.
Page Steel & Wire Co.
H. E. Steinbock
Reid-Avery Co.
Roebling, John A., Sons Co.
Stoody Co.
Wilson Welder & Metals Co.

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Stoody Co.
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Westinghouse Elec. & Mfg. Co.
Wilson Welder & Metals Co.

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International Oxygen Co.

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General Electric Co.
Ideal Face Shield Co.
Lincoln Electric Co.
Mattice Engineering Co., Inc.
H. E. Steinbock
Todd Shipyards Corp.
Westinghouse Elec. & Mfg. Co.
Wilson Welder & Metals Co.
Willson Goggles, Inc.

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American Brass Co.
Bierman-Everett Foundry Co.
Central Steel & Wire Co.
Wm. Cramp & Sons
Manganese Steel Forge Co.
Morris-Wheeler & Co.
Oxweld Acetylene Co.
Page Steel & Wire Co.
Purox Co.
Reid-Avery Co.
Roebling, John A., Sons Co.
Stoody Co.
Torchweld Equipment Co.

FIREPROOF PLASTIC MATERIAL
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Joseph Dixon Crucible Co.
Modern Engineering Co.
National Carbon Co.
U. S. Welding Co.

FLUE WELDERS (Electric)
General Electric Co.

FLUXES
Air Reduction Sales Co.
Bastian-Blessing Co.
Bierman Everett Foundry Co.
Metal & Thermit Corp.
Central Steel & Wire Co.
Morey Flux & Chemical Co.
Peerless Flux Co.
Oxweld Acetylene Co.
Torchweld Equipment Co.

GLOVES (Asbestos)
Chicago Eye Shield Co.
Ideal Face Shield Co.

GAUGES
National Gauge & Equipment Co.
U. S. Gauge Co.

GENERATORS (Acetylene)
Air Reduction Sales Co.
Bastian-Blessing Co.
M. Keith Dunham
Imperial Brass Mfg. Co.
Milburn, Alexander Co.
Oxweld Acetylene Co.
Superior Oxy-Acetylene Machine Co.
U. S. Welding Co.

GOGGLES
American Optical Co.
Chicago Eye Shield Co.
Ideal Face Shield Co.
Willson Goggles, Inc.

GRAPHITE (Rods, Blocks, Paste, Etc.)
Joseph Dixon Crucible Co.

GRINDERS (Portable Electric)
N. A. Strand & Co.
Wodack Electric Tool Corp.

HELMETS (Arc Welding)
Allan Mfg. & Welding Co.
Chicago Eye Shield Co.
Electric Arc Cutting & Welding Co.
General Electric Co.
Ideal Face Shield Co.
Lincoln Electric Co.
Mattice Engineering Co., Inc.
H. E. Steinbock
Westinghouse Elec. & Mfg. Co.
Wilson Welder & Metals Co.

HYDROGEN
Burdett Oxygen Co.
Gas Products Association
International Oxygen Co.

HYDROGEN GENERATING PLANTS
Burdett Oxygen Co.
International Oxygen Co.

LEAD WELDING UNITS
Air Reduction Sales Co.
Bastian-Blessing Co.
Buffalo Dental Mfg. Co.
Burdett Mfg. Co.
Carbic Mfg. Co.
General Welding and Equipment Co.
International Oxygen Co.
Imperial Brass Mfg. Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Purox Co.
Superior Oxy-Acetylene Machine Co.
Torchweld Equipment Co.
U. S. Welding Co.

LIGHTERS (For Gas Torches)
Air Reduction Sales Co.
Bastian-Blessing Co.
Buffalo Dental Mfg. Co.
Burdett Mfg. Co.
Carbic Mfg. Co.
General Welding and Equipment Co.
International Oxygen Co.

No. 17 Wilson "Color-tipt" Welding Wire was used on These Important Jobs

Rebuilding Locomotives

Here Are Jobs That Prove the Quality and Economy of WILSON WELDING WIRE

THE left hand illustration above shows how the Cuba Railroad extends locomotive frames, the work being done in its Camaguey shops. The right hand picture is of a locomotive built from spare parts and miscellaneous material by the Chaparra Railroad Company. This work was done in its Delicias shops, Delicias, Oriente, Cuba.

You may not want to build or even repair locomotives, but these jobs prove the *quality* and *economy* you will always find in the use of Wilson Welding Wire. Simply select the correct grade for the welding *you* want to do.

There is no possible economy in the use of cheap welding wire. That is why Wilson insists on *quality*. Suppose you try to save one, two or three cents a pound on wire. What does this amount to against your total investment in the job, including often the time and labor of disassembling and assembling? Wilson Welding Wire is your assurance of the utmost in quality and that uniformity which is imperative to perfect welding.

Always use Wilson Welding Wire—"Color-tipt" (coated and tipped with designating color) or bare (uncoated and untipped). Write us today for information and prices.

Insure your welding jobs being done right the *first time* by always using Wilson "Color-tipt" Welding Wire—the utmost in quality and economy.

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WILSON

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Modern Engineering Co.
Oxweld Acetylene Co.
Purox Co.
Superior Oxy-Acetylene Co.
Torchweld Equipment Co.
U. S. Welding Co.

MANIFOLDS
Air Reduction Sales Co.
Bastian-Blessing Co.
Burdett Mfg. Co.
Carbic Mfg. Co.
General Welding and Equipment Co.
Imperial Brass Mfg. Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Purox Co.
Superior Oxy-Acetylene Mach. Co.
Torchweld Equipment Co.
U. S. Welding Co.

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Oxweld Acetylene Co.
Torchweld Equipment Co.

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Wilson Welder & Metals Co.

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Bastian-Blessing Co.
Burdett Mfg. Co.
Carbic Mfg. Co.
General Welding and Equipment Co.
International Oxygen Co.
Imperial Brass Mfg. Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Purox Co.
Superior Oxy-Acetylene Machine Co.
Torchweld Equipment Co.
United States Welding Co.

NITROGEN
Air Reduction Sales Co.
Gas Products Association
Linde Air Products Co.

OXYGEN
Air Reduction Sales Co.
Burdett Mfg. Co.
Gas Products Association
International Oxygen Co.
Linde Air Products Co.
Purox Co.

PREHEATING DEVICES AND OVENS
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Buffalo Dental Mfg. Co.
Metal & Thermit Corp.

REAMERS (Portable Electric)
N. A. Strand & Co.
Wodack Electric Tool Corp.

REGULATORS
Air Reduction Sales Co.
Bastian-Blessing Co.
Burdett Mfg. Co.
Carbic Mfg. Co.
General Welding and Equipment Co.
International Oxygen Co.
Imperial Brass Mfg. Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Purox Co.
Superior Oxy-Acetylene Machine Co.
Torchweld Equipment Co.
United States Welding Co.

RESISTANCE WELDING MACHINERY
Acme Electric Welder Co.

TANK CONNECTIONS
Air Reduction Sales Co.
Bastian-Blessing Co.
Burdett Mfg. Co.
Carbic Mfg. Co.
General Welding and Equipment Co.
International Oxygen Co.
Imperial Brass Mfg. Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Purox Co.
Superior Oxy-Acetylene Machine Co.
Torchweld Equipment Co.
United States Welding Co.

THERMIT WELDING
Metal & Thermit Corp.

TORCHES (Welding and Cutting)
Air Reduction Sales Co.
Bastian-Blessing Co.
Burdett Mfg. Co.
Carbic Mfg. Co.
General Welding and Equipment Co.
International Oxygen Co.
Imperial Brass Mfg. Co.
K-G Welding & Cutting Co.
Milburn, Alexander, Co.
Modern Engineering Co.
Oxweld Acetylene Co.
Purox Co.
Superior Oxy-Acetylene Machine Co.
Torchweld Equipment Co.
United States Welding Co.

TRUCKS (Cylinder)
Bastian-Blessing Co.
Burdett Mfg. Co.
Carbic Mfg. Co.
Oxweld Acetylene Co.
Torchweld Equipment Co.

VALVES
Air Reduction Sales Co.
Bastian-Blessing Co.
Burdett Mfg. Co.

WELDING COMPOUND (for Shape Weld-
Air Reduction Sales Co.
Joseph Dixon Crucible Co.
Modern Engineering Co.
National Carbon Co.
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The Welding Engineer 608 S. Dearborn St., Chicago

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Salisbury....Cor. Mill and Hight St.

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BACK of every WELDITE Rod are five years of painstaking experimental work conducted in our own Research Laboratory. The results are evident in the welding characteristics and uniformity of each rod in the WELDITE Line. They make better welds.

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Carbon and Lead Burning, Brazing and Soldering Outfits

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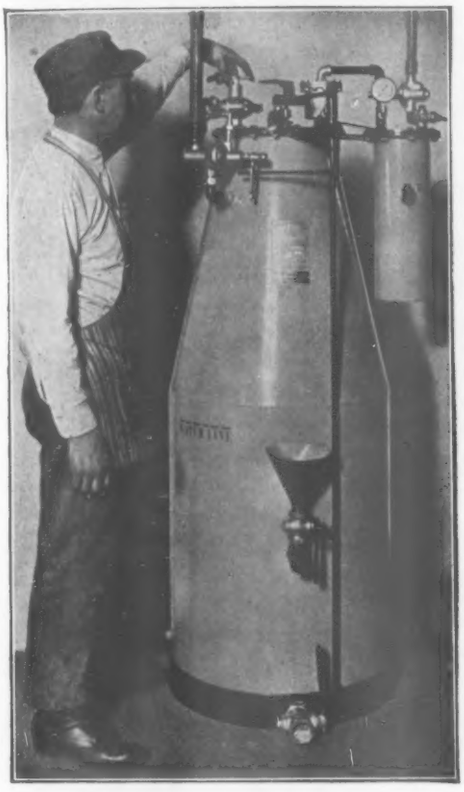

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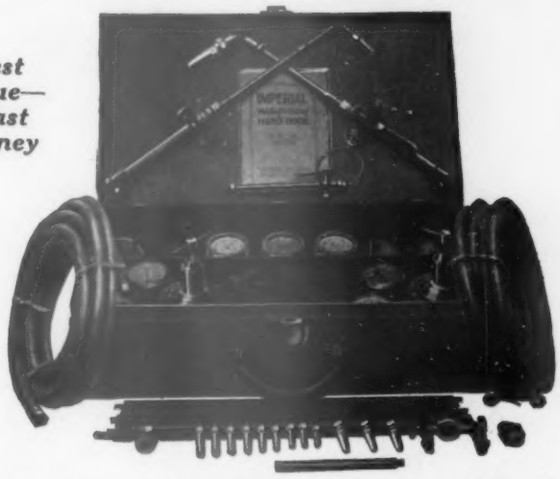
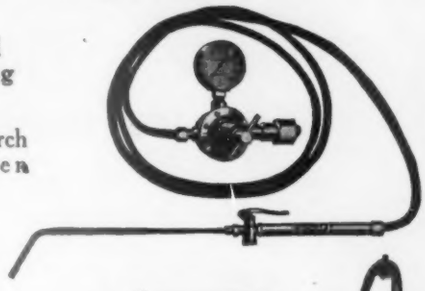
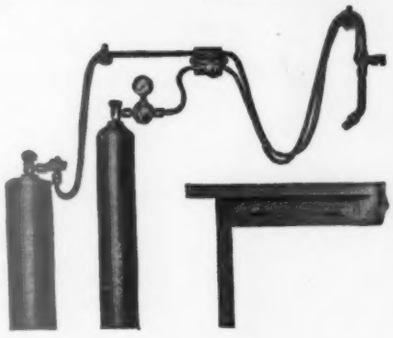


No. 5 Imperial Welding, Cutting and Carbon Burning Outfit

No. 6 Imperial Carbon Burning Outfit

Packless valve on torch prevents all oxygen wastage.





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for oxygen and acetylene. The standard outfit for battery shops.

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uses acetylene gas for brazing, soldering and radiator work.

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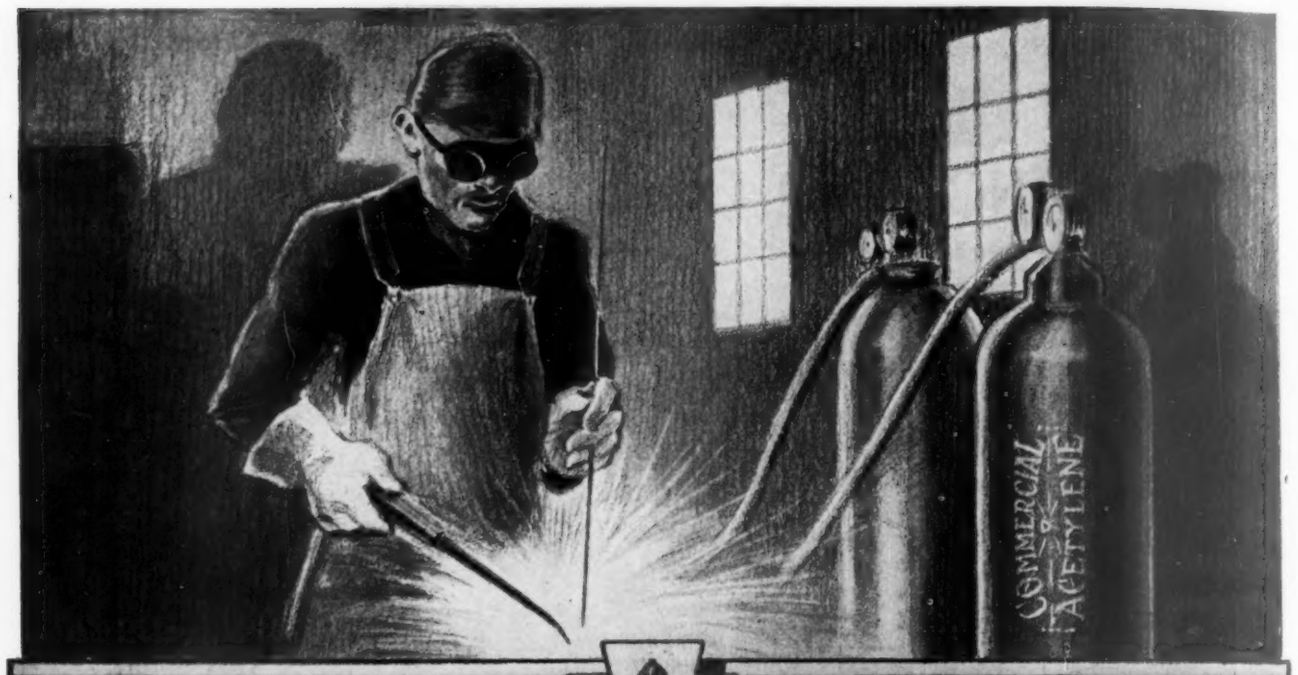

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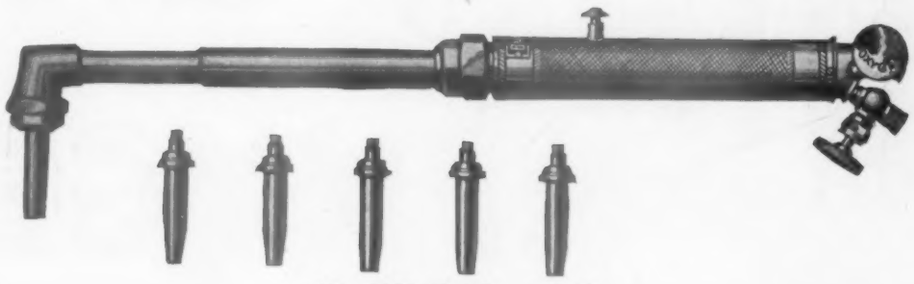
You Have Never Seen a Torch Like This



No. 2830 Cutting Torch

Selection of tips from Nos. 0 to 5. Heads 75 or 90 degree angle — Extensions any length desired.

This cutting torch is a supreme development.
Its simplicity commends it.

The single sturdy extension will withstand the most severe usage in steel mills, steel foundries, shipyards, boiler shops, scrap yards and manufacturing plants.

For use in the open where a very tenacious flame is required in cutting metals that have been exposed to weather and covered with rust and dirt, the torch will give exceptional service.

General qualifications:

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2nd—Sturdy single extension.

3rd—Splendid mixing of the pre-heating gases delivered at proper velocity, resulting in the next remarkable qualification.

4th—Non-backfire or flash-out of the pre-heating flame. The end of the tip can be rubbed in the molten metal and the flames will continue to burn.

5th—Close drilling of the pre-heating holes furnish concentrated heat for a quick start and clean kerf.

6th—The forged torch head of special metal will last the lifetime of the torch without splitting or threads stripping.

7th—It will cut with equal success thin sheet steel or the heaviest steel billets or steel castings, possible with a hand torch.

8th—This torch will cut any ordinary sections of cast iron, using the regular style tips. For heavier cast iron cutting, special tips are furnished. The kerf is clean and narrow although somewhat wider than in a steel cut. Detailed instructions furnished for cast iron cutting.

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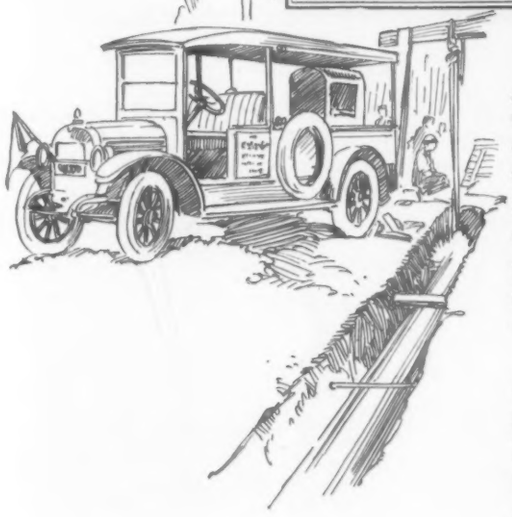


TODD TWIN POLE ARC WELDERS ELECTRICALLY WELDED THIS GAS MAIN IN HALF THE TIME

ALL general welding repair shops are called upon to do considerable field work, necessitating the use of a gas-engine driven type of welder. Without this, it would be expensive to carry enough welding machines adaptable to various power circuits in different districts. In some cases available power is direct current. In others, it is alternating current of varying characteristics. In field work scaling, chipping, grinding, and in some cases drilling is required. This means that an air compressor would be necessary in addition to the welding machine.

Equipment to meet all these demands would comprise approximately seven machines of various characteristics. For instance, one each the following: 110 volts D.C.; 220 volts D.C.; 550 volts D.C.; 220 volts, 60 cycle, 2 phase A.C.; 220 volts, 60 cycle, 3 phase A.C.; 440 volts, 60 cycle, 2 phase A.C.; 440 volts, 60 cycle, 3 phase A.C. These machines would represent an expenditure of close to $7,000.

The Todd Twin Pole Arc Welder gasoline-driven types ER and ER2 are the most practicable for field work. In addition to providing power for welding, current is available for operating electric drills, grinders, chippers, lights, etc. The maximum power furnished for this purpose is 125 volts, 2 K.W. (2000 watts) for the ER type, and 125 volts, 2½ K.W. (2500 watts) for the ER2 type.

TODD NEW YORK, U.S.A.

This desirable additional power and light feature in no way interferes with the welding circuit. Todd welding Engineers are available for advice concerning requirements, etc. Send for descriptive literature.

TODD TWIN POLE ARC WELDERS
25 Broadway New York City

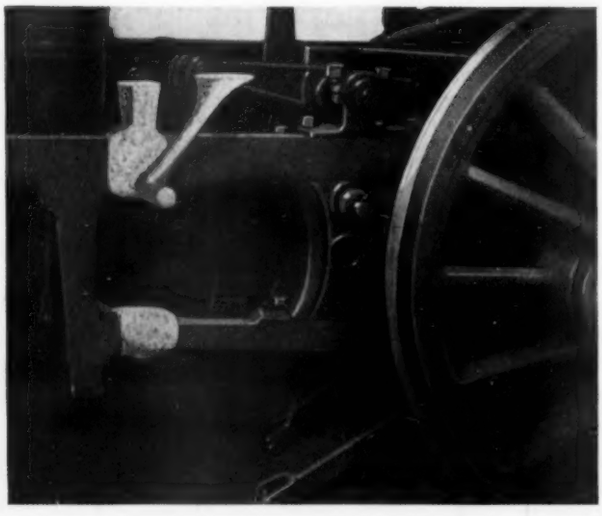
TODD TWIN POLE ARC WELDERS

FERALITE

for welding all heavy steel and iron sections

FERALITE produces in bulk superheated liquid steel by the Aluminothermic reaction. This liquid steel fuses with the sections to be welded, forming a single homogenous section.

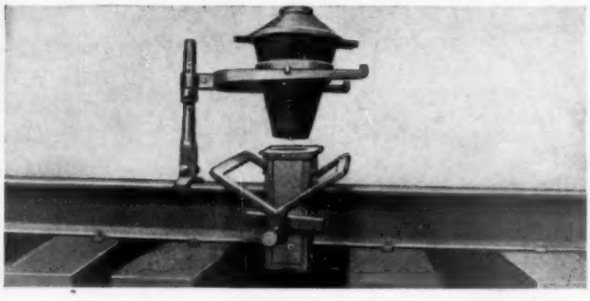
FERALITE Welding of Locomotive Frames, etc.



The FERALITE weld fully equals in tensile strength and elongation the parent steel.

***FERALITE-Weld* all your locomotive frames, cross heads, guide yokes, rocker shafts.**

***Illustrated:** Two FERALITE Locomotive frame welds showing upper weld before removing gates and riser.*



FERALITE RAIL WELD

Eliminates the joint. The FERALITE weld is as strong as unwelded parts in tensile bending and other strains. The electrical conductivity is the same as rail itself. The illustration shows arrangement of mold and automatic crucible.

FERALITE Welding in Mills and Foundries

The FERALITE weld fully restores broken rolls, pinions, rolling mill housings, rings, crankshafts, shears, charging machines for open hearth furnaces, spindles, cinder ladle frames, connecting rods, broken teeth in large pinions, etc.

The simplicity, economy and definite superiority of FERALITE welding is easily proved. Write now stating your requirements, and ask for prices, facts and figures. *Then use FERALITE and convince yourself.*

ALUMINO-THERMIC FERALITE TRADE MARK WELDING MIXTURE

ALUMINO-THERMIC CORPORATION
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Duo-Fold Safety Oxygen Gauge

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Mechanically Perfect

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Maybe your welding problem is unique

PERHAPS a new welding method will have to be developed. Possibly the problem will need some engineering thought. It is even conceivable that competent welders will have to be selected and organized into a department.

If you have such a job on hand you will want advice from someone who is more than an expert welder. You can get this kind of help from a Linde Service Supervisor.

Service Supervisors are men of wider experience and broader training than the Service Operators. They act as technical aids to the division sales managers and make their headquarters at the division offices.

NOT LONG AGO a piping contractor had one of those jobs that was going from bad to worse. He was discouraged and ready to quit. Furthermore, the customer was ready to have him quit. A Linde Service Supervisor appeared on the scene. He recommended a better type of welded joint. This was adopted. He suggested training a crew of welders. He outlined a plan for organizing the work; and then he withdrew. The job was finished—completely satisfactory—and ahead of time. We quote from the contractor:—

> "... In these days of so much talk of service and so little except talk, the real service you have rendered to us, to our customer and, incidentally, to the general good of the welding business, is refreshing."

Linde Service Supervisors are a part of Linde Process Service which is free to all Linde users for the asking.

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37 Plants *22 District Sales Offices* *80 Warehouses*

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YOU CAN DEPEND ON THE LINDE COMPANY

Gas Welding Pipe Coils

Jigs Patterns and Common Sense Combine to Turn Out Quality Refrigeration Units—Operators Trained in Plant

COILS and more coils, in every conceivable shape, size and form fill the shipping yard of the Pipe Bending Department of the Chicago Nipple Manufacturing Company at the end of a busy day. Closer observation reveals the fact that they are welded coils which in a short time will be playing an important part in the refrigerating industry. Some will go into active service in refrigeration systems while others will keep the corner store's ice cream nice and firm so the kiddies can all have their ice cream cones and sodas.

Bending the Coils

The coils which are designed for use in the soda fountain are on contract order by the largest and best soda fountain manufacturers in the city. This speaks for the character of work which is turned out in this plant.

Great importance is placed upon the pipe bending machine which has been developed and manufactured for this specific purpose. Without the extremely accurate bends the welding would be valuless. That is to say, no matter how good the welding was, it would not turn out a high quality product, for these coils must all meet certain very strict requirements. The variation of a fraction of an inch from the specifications would make the coils absolutely useless, because they would not fit into the containers designed for them, and the repeat orders would be an unknown quantity.

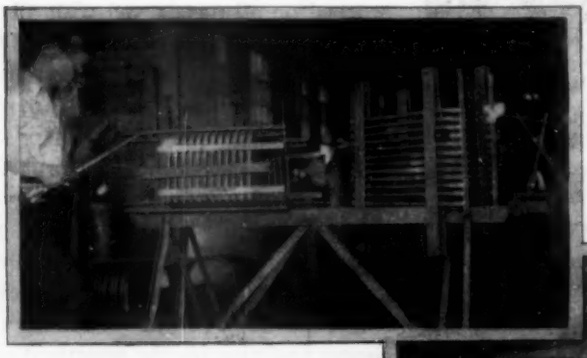
All-Welded Pipe Bumper

John W. Bowlby is the manager of the pipe bending department, and the man directly responsible for the welding is his able assistant A. C. Griebe. Mr. Griebe has been in the welding industry almost from the beginning and his experience is necessarily extremely wide. He has worked on all metals and with all processes. Consequently he is capable of giving excellent advice and instruction to the men in his employ. However, the question of obtaining good sound welds never enters into the problem at all. It is almost sufficient to say that one of the men has been on the job eight years and another one ten years. That speaks volumes for the working conditions under which the coils are fabricated and also for the treatment which the welders receive. Mr. Griebe says, "When I find a young fellow shows signs of promise, that he is interested in his work, and that he really is trying to weld in the best possible manner, then I take extra time with him. In this way we always have capable welders on the job. We never are short of welders for some of the boys in other departments are always coming right along. Frequently I put on the overalls, gloves and goggles and go right to work besides the men for a week or so just so that I can teach them all I know about the oxy-acetylene welding of pipe coils." This is the right way to go about the development of welders who are highly skilled and capable of turning out perfect work without watching.

Mr. Griebe has such confidence in his men that he says the work would go right along just as if he wasn't there if he were to absent himself from the shop. Every man knows his duties and tends to them. A certain amount of responsibility is placed upon the individual workman and a fair system of graduation to better jobs is in force. In addition to the knowledge they receive from Mr. Griebe, the majority of the welders in the plant are subscribers to the trade

Showing Variety of Coils—All Welded. At Right—Mr. Griebe

journals of the industry and Mr. Griebe keeps authoritative welding text books on hand for outside study by all those sufficiently interested to want to take the books home. This plan also has met with great success and he feels that this sort of cooperation between the company and the welder is highly desirable and should be inaugurated in every welding plant or plant in which welding plays an important part.



Top—Special Jigs Simplify Welding

Center—Soda Fountain Refrigerating Coils After Testing

Below—Stopping Leak Found in Testing Tank. Tank is Shown in the Background

The coils are made from straight pipe which is bent in the special bending machines installed in the plant. After the bending process the various pieces of pipe, which go to make up one continuous coil, are clamped together in special holding devices. These holding devices have all been developed by the men in the shop with the assistance of Mr. Bowlby and Mr. Griebe. When a new type of coil is to be fabricated it is carefully studied. Then the proper clamps and jigs are made up and the work proceeds. After the job is finished the clamps and jigs are kept on hand for future use. Practically all of their work is on small diameter pipe which requires no leveling.

Besides being lined up perfectly one above the other the coils must also be spaced a certain distance apart. This distance varies for different coils and is a very important point in coil construction. After the coil is completed it is submerged in a cement testing tank. This tank is about five feet deep, eight feet wide and twelve feet long. A coupling connects the coil to the air pressure line and a pressure of from 400 to 450 pounds is turned on. In this way the very smallest leaks can be found and rectified before the coil leaves the shop. On some coils it is not necessary to subject them to a test with air pressure and on this type an hydraulic or water pressure test is used. The water test is run on receivers and a pressure of from 800 to 1200 pounds is used.

Mr. Griebe is the originator and builder of an attractive three bar or rather pipe bumper. This he built in self protection for his Ford sedan. It is welded throughout and the brackets and mountings were all made with oxy-acetylene torch. The bumpr consists of three lengths of three quarter inch pipe held at the proper spacing by short lengths of pipe which are welded in place at the middle and at each end. The bumper after being welded is given two coats of black enamel and then nickel plated caps are screwed on the ends of the pipes. The end clamps are also nickeled and give the bumper a very attractive as well as sturdy appearance. One can well imagine the envious glances which this set of front and rear bumpers receives when Mr. Griebe drives forth on a Sunday afternoon.

NEAT WELDING JOB ON TAIL SHAFT

A neat building up job was recently completed by Mr. F. A. Hoyt, of Rhode Island, and is illustrated in the accompanying photographs. The work was done on the tail shaft of the steamer New Shoulian at a place where the propeller bearings

Two Views of Welded Shaft

fit. This job required 28 hours because two layers of welding were used. After the welding was completed it was ground down to size by an air grinder and was found to be perfectly satisfactory to both the inspector and the owner. The illustrations indicate very clearly the procedure followed in this job.

MATTICE WELDING HANDLE

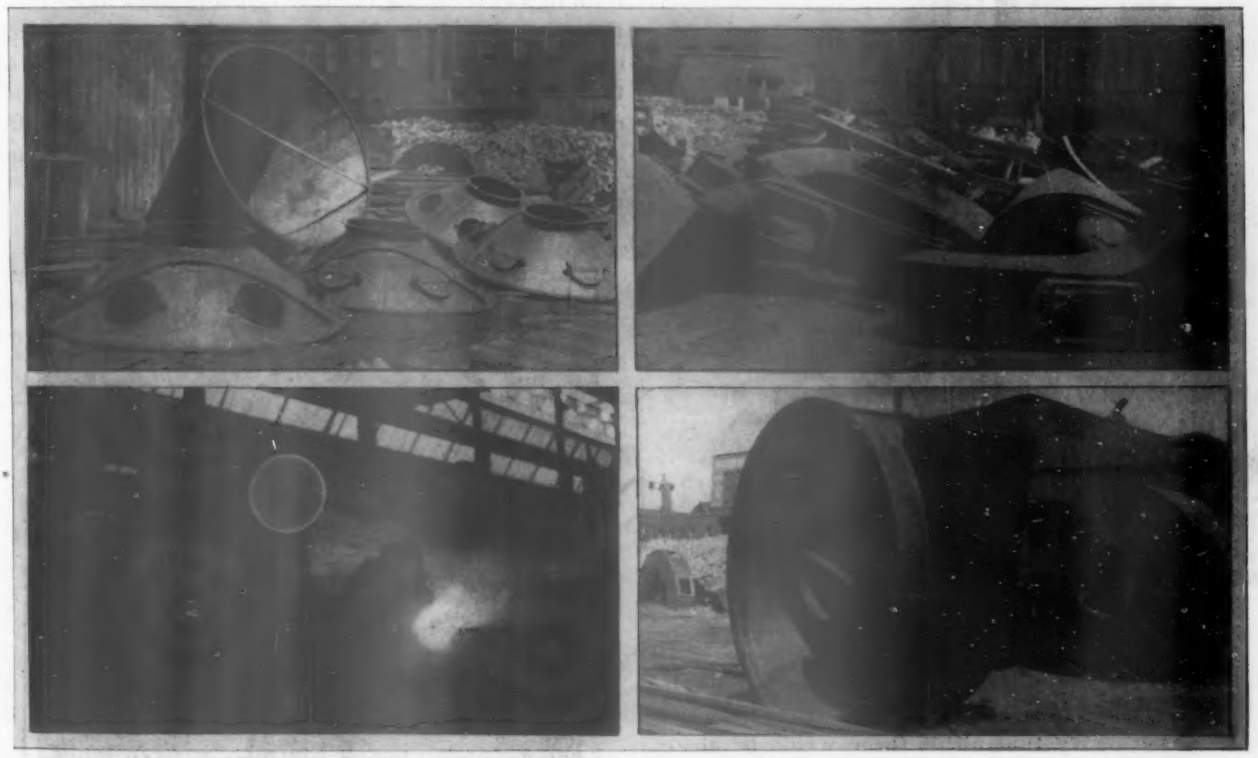
The Mattice Engineering Co., Inc., Philadelphia, Pa., manufacturers of the Mattice Metallurgical Short Arc Welder, have placed on the market a new type of welding handle for which especial advantages are claimed. It is also stated that the handle springs will not burn out or fall out. Sales agents will be appointed in industrial centers.

The Arc in the Sheet Metal Department

Persistent Study of Operating Problems Results in Complete Satisfaction with Welded Joints in Chicago Factory

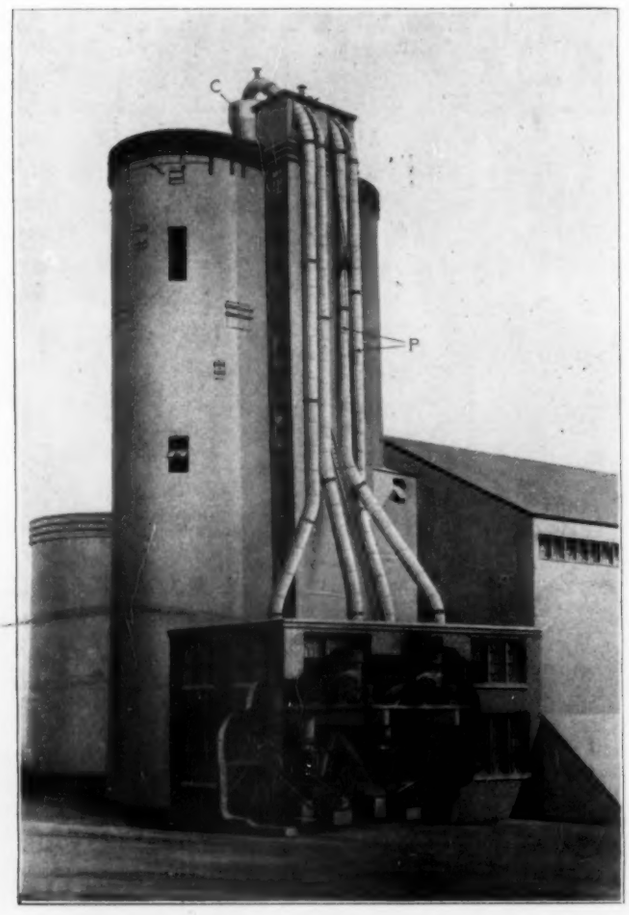
MANY sheet metal products which were formerly assembled by the riveting process are now being made cheaper and stronger by the substitution of welded joints for riveted joints. The successful application of the arc welding process to a great many of these fabrication problems is being materially hastened by the painstaking study and effort of such firms as the Raymond Brothers Impact Pulverizer Company of Chicago, which during the past few years has made tremendous strides in the application of arc welding in its sheet metal department. Raymond Brothers have been manufacturing grinding, pulverizing and air separating machinery, for the reduction of materials to powdered form, for over forty years. Their products include roller mills equipped with air separation, automatic pulverizers equipped with air and separation, vacuum air separating plants, special exhausters and dust collectors. In addition, they design special machinery and devise methods for grinding, pulverizing and separating various materials. The list of materials which is being handled by the Raymond pulverizing and separating outfits mounts into the hundreds. This system was developed as a substitute for the use of bolting cloth for separating and is based on new principles, including that of air separation. The important features claimed for this type of pulverizing equipment are that it eliminates the necessity for elevating and conveying equipment and that it is dustless. It is also said to be more efficient and less expensive to operate.

A complete Raymond system consists of grinding mill or pulverizer, an air separator, exhaust fan, cyclone collector, a tubular dust collector and the necessary connecting pipes of galvanized steel. The construction of one of these mills, therefore, necessitates the use of a wide range of thicknesses of sheet metal and a great variety of joint design. When welding was first introduced in the sheet metal department of this plant, some difficulties were experienced in getting satisfactory joints at a reasonable cost because it is not easy to find operators who are skilled in arc welding sheet metal. They have found, however, that is possible for a first class arc welder to attain proficiency in this particular type of welding and through experience to become able to solve practically any construction problem turned over to him. The accompanying photographs show clearly enough that the production welding carried on in this plant



Upper Left—Tops for Air Separators. Designs Like This Do Not Stump a Good Welding Department. Upper Right—Return Air Housings Welded Throughout. Lower Left—In circle, a Longitudinal Seam Meets a Circumferential Seam at an Angle, Yet There Is No Distortion. Lower Right—Good Welding Leaves the Corners Straight, True, Tight,—and Strong.

means a combination of a number of long seam welds, with very frequent occasions where the design calls for very careful workmanship. The superintendent takes particular pride in the appearance of the finished product and this pride is quite justified. All the photographs were taken of routine jobs just as they were left by the welder. The lines of welding are shown very clearly and in all of the pieces there is a marked absence of distortion or warping. As far as the advantage to the finished product is concerned, the welded construction is more economical and



A Complete Raymond Installation

stands up much better in service than riveted joints could be expected to last. Although there is no pressure, it is necessary that all of these welds be absolutely dust tight because tightness is one of the important features emphasized by Raymond Brothers in their advertising and in their literature.

The construction of nearly every one of the different parts of the Raymond system involves joints between metals of different thickness and the problem of getting satisfactory joints under these conditions is taken care of by practice in directing the arc and regulating the heat so that the right penetration is secured for the thicker section while, at the same time, there is no burning through on the thinner section. One good example of this sort of work is shown in the picture of the fan housing. The face of this housing is ¼-inch plate welded to a ⅝-inch ring and the side of the housing is of 3-16-inch plate welded to the ¼-inch face. These housings are turned out regularly without any evidence of warping and the success in this line is a tribute to the fine workmanship displayed by the Raymond organization. The plant is a busy one and, in fact, works both day and night shifts a good deal of the time. Eight or ten welders are regularly employed, of whom two or three are experts on the arc welding of sheet metal. In the organization of this welding department it has been found by experience that it is very difficult to secure welders from the outside who are able to handle this work in a satisfactory manner, so a policy has been adopted of developing welders from workmen who show an aptitude for the work. They are put under the charge of more experienced men whenever there is an opportunity to give them some instruction and are gradually taught the principles of sheet metal welding.

The illustrations, if examined carefully, will tell quite a story of the economy which has been secured by substituting welded seams for riveted seams. There is an immense saving in drawing room work alone since the necessity for locating the rivet holes on each piece of sheet metal has been eliminated. On most of this work it is not necessary to bevel the sheets because they are so thin that the arc accomplishes sufficient penetration. The different pieces of one assem-

Three Different Thicknesses in This Housing—A Fine Welding Job.

bly are tack welded together rigidly enough to hold them in place while the seam is is being run.

Another place in this factory where welding saves a good many dollars is the experimental room. Thousands of dollars are spent here annually in trying out ideas for the improvement of present apparatus and the construction of apparatus for special purposes. Small models of complete installations are made by using welded construction throughout, at a fraction of

(Continued on page 22)

Servicing the Welder

Suggestions Which Will Enable the Welder to Get Better Service from His Welding Supply Dealer

By F. Drewes*

THIS article treats of the difficulties met in interpreting and filling the welder's order for supplies and accessories and offers a few suggestions for eliminating delays in completing the welder's order.

The progressive oxygen and acetylene manufacturer and distributor of today carries a complete line of welding and cutting supplies and accessories including filler rods used for all applications, fluxes, goggles and spectacles, rubber and copper armored hose, carbon blocks and rods, asbestos paper, sparklighters and tips. Many of these commodities are stocked in various sizes, coatings and colors at a variety of prices applying on quantity lots.

Study Manufacturers' Literature

The greatest obstacle to the successful servicing of an order is in the ignorance of the welding trade. Manufacturers continue to publish price lists and bulletins in large quantities at great costs, revising them as often as four times a year. These price lists are mailed to all customers, prospective customers and in fact, to every welder on the mailing list. The knowledge contained in these price lists is invaluable to the welder. Rods are classified or listed according to their proper uses with brief yet complete comments on their proper application, together with the various sizes carried in each style rod and the prices are clearly shown on the quantity lots. And so with every other commodity.

Give Information When Ordering

Notwithstanding this intense, educative method of bringing the products to the attention of the welder, he will invariably place his hastily written order for so many rods, which he often terms "sticks" for immediate delivery. Quite often the welder will simply mail in his check requesting steel or brass rods to cover face value of check. No mention is made of the job to be performed, the size of rod best suited to the welder's purpose, the size of the job, or the price rod desired. The welder also fails to take into consideration that the postage or express charges on a small rush shipment equals or exceeds the cost of the few rods ordered.

Name Torch Style in Tip Orders

The welder would do well to consider that the order clerks and storekeepers who receive, interpret, enter and fill his orders are men trained in the proper use of each rod, flux, tip, etc., and the briefest description of the material required for a particular job would, as a general rule, prove sufficient to correctly fill the order. In the case of placing an order for tips, it is suggested that the welder mention the particular style of torch for which the tips are intended, together with some idea as to the nature of the work the torch will be subjected to. Considerable time is taken up in an office of a manufacturer or distributor endeavoring to check the ledger experience of the customer to find out as to whether or not such an order had been previously placed. If the ledgers and correspondence files fail to reveal what is wanted, it is then necessary to take time to correspond with the welder to determine just what material is required. The cost of a letter to the dealer or distributor has been figured to cost from fifteen to twenty cents which cuts into the legitimate profit. However, no expense is spared by the dealer to satisfy his customer. When the welder receives his letter he is quite often forced to quit, clean up, sit down and perform the laborious task of writing a letter out in long hand (the typewriter is seldom used by the trade) in order not to delay shipment of his order any longer than is absolutely necessary. The welder's time is taken up which eventually shows up in the profit or loss of the job at hand.

Get Advice on New Applications

New applications are constantly being made in the procedure of welding. The thoughtful and considerate manufacturer and distributor is equipped to test the advisability of new applications through their research laboratories equipped with all the modern devices for testing, experimenting, building up and checking into the practicability of new applications. The welder is at liberty to bring his problems and experiments to the attention of the service department of such an organization. A number of manufacturers, including the Air Reduction Sales Company, endeavor to inspire and maintain the confidence of their customers, through superiority of their products and by presenting them through a sales-service organization that receives from the company practical instruction and training in the use of these products.

Use Manufacturer's Repair Service

Probably the greatest obstacle to the welder is the problem of making prompt repairs to his welding and cutting equipment. No welder should experiment with his equipment in need of repairs, but instead, send in his equipment to the nearest service station for necessary attention. Considerable time could be saved and delays in repairs eliminated if the welder in sending in his apparatus would write a brief note explaining the

Chief Clerk Air Reduction Sales Co., Richmond District.

nature of his troubles, or on the other hand, if unknown to him he should authorize the manufacturer to proceed with the repairs providing his apparatus is found after inspection and appraisal to be worthy of repair. Every manufacturer is desirous of making repairs in the shortest possible time in order to get the equipment back into service and at a reasonable cost to the welder. The tying up of equipment means typing up of jobs and the loss to the welder of profits on his jobs. The delays entailed in making repairs to apparatus may be summarized as follows: (1) failure on the part of the welder to properly pack and tag apparatus returned for repairs; (2) failure on the part of the welder to forward his order authorizing repairs or letter of explanation at the time shipment is made in order to avoid additional correspondence; (3) a torch is often sent in for repairs and found upon inspection to be in perfect working order when in reality the tips are at fault, and more often, the trouble may be located in the hose. This requires additional correspondence, loss of time and expense in returning apparatus which could be avoided by the welder making a more careful inspection of the source of trouble; (4) welders endeavor to repair their own equipment which is in itself bad practice. In ordering necessary parts for such repairs, the average welder fails to furnish sufficient descriptive information. It is suggested that the welder submit drawings or samples where descriptive information is lacking; (5) any delays in repairing apparatus cause the welder to become dissatisfied with his equipment, the manufacturer receives a bad reputation and eventually the welder listens to the sweet song of a salesman who carries a competing line of apparatus with the result that the originally purchased apparatus in need of a little attention is thrown into the discard.

Tell Your Troubles to the Salesman

Welders! Consult the salesman or office through which the apparatus was originally purchased before casting your old apparatus aside. The manufacturer or representative will be fair with you and give you an appraisal and service to which you are entitled at reasonable prices.

The ability of the welder to certain success lays not alone in his ability as a welder but in his forethought in placing his orders for his welding supplies and in promptly locating and disposing of "troubles" to his equipment.

The welding business is a business in which the trained man at a desk in an office or a storeroom serves as a first aid to the trained welder on his bench or job. Both work hand in hand for the success of the welding industry.

THE ARC IN SHEET METAL DEPARTMENT

(*Continued from page 20*)

the cost of building such working models with riveted joints.

Those who are interested in the possibilities of using welded joints as a substitute for riveting for any kind of sheet metal shapes can find in the accompanying series of photographs answers to practically any question concerning the limitations of the process determined by the design of the piece to be assembled. In the Raymond Brothers factory the faith in welding is practically unlimited and the policy is to apply the process as universally as possible.

WILSON PRODUCTS ON DISPLAY AT WEMBLEY

At the recent British Empire Exposition held at Wembley, G. D. Peters & Co. Ltd., British representatives of the Wilson Welder & Metals Company, Hoboken, New Jersey, prepared a very attractive display of Wilson Welding Machines and Wilson Color-Tipt Welding Wire. The Exposition was held in the Palace of Engineering at Wembley which is just outside of London. In addition to displaying the products shown actual demonstrations of metallic arc welding were given and numerous samples and test pieces were brought by various industrial concerns and some of the railways in order to demonstrate the application of arc welding in the several shops. The Wilson Welder & Metals Company were represented at the demonstration by Robt. G. Forsyth who was particularly pleased to note the lively interest in electric arc welding by the visitors.

Wilson at Wembley

GLANCE THROUGH THESE IN YOUR SPARE TIME

Who says that our colleges are not posted in the oxy-acetylene process? The following is quoted from one of our leading college publications:

TODAY

Sir Gallahad: Squire come hither, anon.

Squire: Aye, aye, lord?

Sir G.: Go yonder and fetch me that acetylene torch. I have a bedbug under my shirt.

One of our correspondents in the northwest forwards a copy of a press dispatch relating how a truck driver was struck by a lightning bolt, which broke his watch chain, tore off his pants, and welded together two silver dollars in his pocket. The account is supplemented by the remark that no reputable welder would charge so much for a job that the customer has to wait for night to come so he can go home.

Stiffening Front Axles

Chrome Nickel Steel Reinforcing Bars Plus Chrome Nickel Steel Electrodes, Equals an Axle Better Than New

ONE of the largest taxi cab companies in the country has found it very profitable to stiffen the front axles of their cabs by welding in a reinforcing bar of metal. Because of the value of this simple process it is well to go into a little detail in passing it on to the job welding shop, where such work often finds its way, and to the automobile welding shop and the garage fortunate enough to be equipped with the welding process.

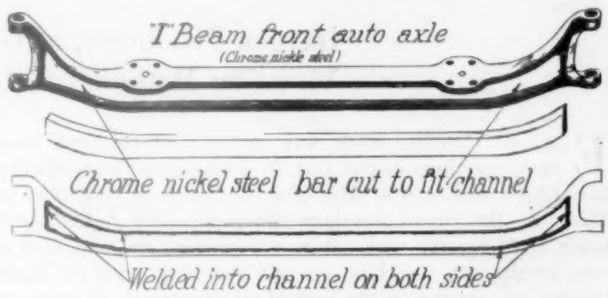
The taxi cab is not the only light car which receives hard usage. The high speed delivery truck, the overloaded converted Ford truck, the light express truck, which hauls heavy loads, the converted pleasure cars, which have seen better days and are now trucking, and even the family car, which is loaded down in the spring time and taken on long tours over rough roads through the long summer, all need a lot of repair work. A great deal of this work is done on the front axle. The reason for this is that the heavy loads, the high speed of travel and the rough roads all tend to rack the front system of the car. The bushings in the front spindles wear excessively and must be replaced and the front axle often is bent out of alignment by careless driving. When the axle is out of line the tires wear down to the fabric almost over night. A little publicity along that line will be the means of bringing in a lot of this business to the shop equipped to handle it. Accidents also cause the axles to be badly bent and here again is a chance to do some profitable work for yourself and at the same time save your customer a lot of time and money.

Sorry to say however, there has been a great deal of discouragement peddled about regarding the straightening of axles, or any other parts of the car, and then putting them back in service. These negative arguments really have no place in the present scheme of things, for this one company in particular has solved the front axle problem completely. In fact, the axle comes out of the shop stronger, tougher and stiffer than new and it has proven that it will give better service than a new one and stand up longer under adverse driving conditions. They should know, for they have thousands of cars on the road all the time, day and night.

Automobile welding is no different than any other type of welding and if the work is done properly there is no reason why it will not give the utmost in satisfaction, just as it does in other fields. Care, of course, must always be taken to protect the work from heat so that the paint is not damaged. But this is getting a little off the subject.

To get right down to the point of this article let us begin with the front axle removed from the chassis. The average front axle is made of chrome nickel steel. The purpose of the chromium in the steel is to make it tougher and harder than ordinary steel. Of course this chromium content makes the welding a little more difficult than it would be on mild steel for it has a tendency to form chromium oxide and this makes a nasty looking coating on the surface. This cannot be overcome by the use of any flux although the use of borax or boracic acid will help to a certain extent. It is also wise to stir up the metal as little as possible and to melt the metal under the coating of oxide. Welding on this class of metal is slower than on mild steel but a front axle can be stiffened on both sides in about two and one-half hours using the electric arc process. The oxy-acetylene process has not been tried out on this work by the organization in question so no data is available at present.

When the axle is removed from the chassis it is heated at the place of bending and then straightened out on an anvil with a heavy sledge hammer. In the average shop this is all that is done to the axle, it is reassembled and the car is put back in service again. Once back in service it is again subjected to the high speed, the heavy loads, the rough roads, and poor driving over curbings, into posts and ruts. Of course the axle has been badly bent once and straightened out again, that should, in the average mind, make it absolutely good again. However, the car owner will readily convict the repair man if the work falls down, if the tires wear unnecessarily fast, or if the axle bends again in the same place.



Method of Stiffening Front Axles.

Although the taxi company had no comebacks from irate customers the bosses nevertheless came back at the shop men who turned out the faulty work. On investigating this problem it was thought advisable to weld a reinforcing strip along one side of the axle. At first they considered this too expensive a process of reclamation and thought that it would pay in the long run to install new axles as fast as the old ones were put out of commission. However, when one considers that the average front axle for this type of car costs in the neighborhood of $40.00 and then considers the cost of welding in the reinforcements, figuring the cost of labor and material, it will be found that this work is very economical. The average cost of doing this repair is about $8.00 an axle.

The sketch illustrates the type of chrome nickel steel axle which is found in common use on the majority of motor cars. It is made up in the form of an "I" beam with channels on either side. Of course it is forged. As these are welded in large numbers the company has had chrome nickel steel bars cut, as illustrated, to just fit inside the channel. These bars are the same composition as the axle, and an electrode of the same material is also used. In this case a bare wire electrode is used. The bar of reinforcing material is first tack welded in position and then welded along the entire length, top, bottom, and sides as shown. A similar piece is welded on the other side of the axle and in this way it is turned out of the welding shop evenly balanced and perfectly straight and true. It is also much stiffer and is better able to withstand the hard usage to which it is subjected than a new one would be. In fact, the instances when a new axle is inserted in an old car are very "few and far" between. About a quarter inch gap is left between the reinforcing metal and the axle all the way around and the electrodes are laid in the groove thus formed. The electrodes are about one-eighth inch in diameter, they are welded right into the groove producing a very excellent weld.

This work has proved a money saver and also a great factor in safety, for when one of these rebuilt axles is put into service one can be sure that it will absolutely hold up under the very worst conditions. No failures have been reported and that speaks for itself.

Promotion for the Oxygen Industry

Oxygen Producers, at G. P. A. Convention, Exchange Views on Methods of Development of Gas Welding

EDUCATIONAL work was strongly emphasized in the open meetings of the Gas Products Association Convention which was held at Mackinac Island, July 21st, 22nd and 23rd. In the closed meetings the papers and committee reports dealt mostly with subjects pertaining to extending the uses of the oxy-acetylene process and improving the opportunities for service on the part of manufacturers of gases and apparatus. The Association has for several years recognized the need for an active educational program and the papers presented at this meeting are full of information which cannot fail to be useful to men who are working for the development of oxy-acetylene welding. Space does not permit the reproduction of all of these papers in full but several of them have been selected and abstracted for this report.

Problem of Training Welders in Schools
By R. K. Randall

(*Presented at the open meeting, Tuesday afternoon, July 21st*)

An interesting aspect of the problem presented to the welding school instructor is that the students who come to him for training are mostly adults whose minds are not flexible and who approach the subject with preconceived notions. The attitude of many of them could be expressed as follows: "Here we are. Now teach us how to weld."

In order to get on a basis of common understanding with them it is necessary to ask these students why they wish to take up welding. Then we find there are as many different answers to this question as there are different classes of students. Still these answers give us a key to the best way of making the personal appeal which is necessary to the success of the instruction.

The student often wants to know whether it is better to study acetylene welding or electric welding. Our response to this is generally that gas welding is best to study first. It is our observation that the acetylene welder has a deeper sense of the welding process and after he has mastered this process it is not such a difficult matter for him to make a sucess of arc welding. It is also true that there are a great many more openings for gas welders because there are so many more welding torches in plants than there are arc welding machines, consequently the trained gas welder has more chance of getting a job.

The instructor always feels a sense of responsibility for allowing a student to pay his money and put in his time on a welding course but it must be remembered also that the student himself assumes his share of this responsibility.

Going back again to the subject of material which the instructor has to work with, very few of the students have completed a high school course although a good many of them have practically completed the grammar school course. Many of them have done enough work of different kinds since leaving school to acquire a certain degree of cleverness and adaptability but their attitude toward the instructor is a very important factor in their training. If they do not lend themselves to the work the instructor is practically stuck. The instructor can check up on three of the things the student works with, that is the torch, the welding rod and his eyes, but the fourth factor, the brain, is very much harder to control.

Experience shows that the best way to mark the progress of a student is by breaking test pieces and that the best way to keep him interested in his work is to arrange for type jobs in which the welds themselves are not very long. When interest seems to be lacking the fault is probably a lack of concentration. We have found that we can make a student himself feel the necessity for concentration by approaching him at a time when his mind seems to be wandering off the job and ask him quickly what he is thinking of. His reply will usually indicate that his mind was not on the job. This is one of the best ways to impress upon the student the necessity for applying his mind to his work.

After the instruction is completed it is the best policy to be absolutely frank with him regarding his ability as a welder and chances for advancement in this trade. Most of the criticism directed against our school is to the effect that we turn out sixty hour men. This is because we advertise a sixty hour course. As a matter of fact the instruction is often in excess of sixty hours and students are given an opportunity to go back over the work and strengthen their weak spots until they have received all the help which the school can give them.

Welding schools need all the practical financial help which they can get. This could be in the form of reduced prices on equipment, gases, supplies, etc. Because this help is so hard to get it will be generally found that economy is the practice in most welding schools. The instructors have a difficult time to get all of the things they need in order to provide as much practical work as they want to give the student and they make every effort to keep expenses down.

In order to be successful the welding instructors themselves need training in teaching, that is, in the theory of

teaching. Telling a man how to weld is not teaching and showing a man how to weld is not teaching, telling a man how to weld and the showing him how is not teaching. In order to really teach the subject the instructor must know how to determine whether the student has absorbed all of the principles of the art and review the work when necessary. This matter of review is very important in teaching.

It is often difficult to find jobs for graduates of a welding school because users of welding have the misguided notion that a man is better equipped after two years of haphazard experience in a number of positions than after an intensive and scientific training in the fundamental principles of handling a torch. Our own experience indicates that a trained welder, if given an opportunity to adapt himself to the work in a plant, will develop into the best kind of a welder with experience and that it is a good policy to give him this chance. As the men complete the course it is necessary to assign them to jobs depending upon their ability on various lines. The openings have to be investigated very carefully so that the instructor can send the man who is best fitted to hold down the particular job offered.

The Oxygen Business in England
By O. Simonis

(Presented at the open meeting Tuesday afternoon, July 21st)

There are a number of conditions affecting the oxygen industry in the British Isles which are quite different from conditions in the United States and, incidentally, quite a few methods of operation which might suggest desirable changes. In some respects the English oxygen manufacturers appear to have advantages over the American gas producers and in other respects the American manufacturer is the one who has the advantage.

In England the cylinder regulations are very severe. The maximum capacity is 150 feet and the weight is 128 pounds; and a two year test is required. These stringent regulations probably represent one reason for the number of pipe line installations and private gas plants operating in Great Britain.

Another interesting difference is that in many cases the customers of British oxygen companies own their own cylinders and buy gas at a reduced price on that account. This is not only an advantage to the customer but is also advantageous to the gas manufacturer because it results in much better service on the cylinders themselves so that a larger quantity of gas is handled in a smaller number of cylinders. As far as insurance is concerned, the regulations prevailing are such that the responsibility of filling a cylinder is placed on the man who fills it.

Many of the English gas customers furnish their own transportation. Very few railroad shipments are made as practically all of the gas is delivered by truck.

The British plants are somewhat handicapped by the necessity for shorter working hours. Plants do not operate over the week ends and, consequently, all the liquefaction plants are thawed out once a week. As far as prices are concerned, it is very difficult to make a comparison on account of the differences in labor costs, transportation, cylinder costs, etc., but on the whole the price situation in Great Britain appears to be somewhat more favorable.

The purity of oxygen furnished to consumers in the British Isles is usually 98 and 99 per cent but it is recognized that purity of 99.5 per cent has advantages for some classes of work.

Competition with electric arc welding is not severely felt because the line between the application of the two processes seems to be more closely drawn in England than it is in this country. Every effort is made to keep the gas welding process working at its highest efficiency by supplying customers with the service of expert demonstrators.

The acetylene supply in England is generally through low pressure generators. There is only one acetylene compressing plant in England.

At the present time the insurance policies in the British Isles favor the low pressure acetylene generating systems.

Great Britain has had a vast experience with the use of the oxy-acetylene cutting torch. The British scrap yards own fifteen or sixteen oxygen producing plants which are used for cutting up ships.

Training Welders in the Plant
By R. K. Randall

(Presented at the open meeting Wednesday afternoon, July 22nd)

In answer to the question about the influence of the unions, our experience would indicate that the unions themselves want to have the men trained in the process but the workers do not seem to be quite so keen about it. One exception seems to be the pipe fitters who are recognizing the value of the gas welding process to their trade and are becoming more and more anxious to secure instruction. The railroad boiler makers also show a tendency to admit welders into the union.

When training welders in the plant the essential thing is to teach them the principles of the process as well as the manner of operating the torch.

It is not unusual to find a manufacturer who objects to welding on account of the importance of the human element. With the best apparatus, the best welding rod and the most favorable conditions for welding there is still some uncertainty as to the results which will probably be secured and that uncertainty is due altogether to the human element. Proper training in the plant is the only way to overcome this uncertainty.

The experience of one manufacturer who was obliged to examine over sixty men in order to select sixteen welders is one of a great many illustrations which could be cited to prove that good welders are not plentiful. On the other hand, it is doubtful if the poor welders outnumber the good ones. The trouble is that there are a great many poor welders unable to hold a job because they cannot give satisfaction and who are constantly trying to get in on a welding job for the money that it pays.

Our present supply of welders consists mostly of men who have learned the trade from demonstrators. It is certain that the schools do not come anywhere near to supplying the market. The sale of a new torch means the training of a new welder and this is usually done by the service man who in spite of his desire to do a good job very seldom has as much time to give to the training of a single man as he really needs. This situation could be improved to quite an extent if each demonstrator would make up a complete list of all of the topics necessary to cover in training a new man and make sure that he covered every topic in the list whenever he got hold of a new student. They should also bear in mind that welding has a whole lot in common with the other trades and that to be a successful welder a man has to have the right traits to start with.

The public schools do not turn out finished welders although a great many of them give some instruction in the operation of the oxy-acetylene torch. In our vocational schools and welding schools we should interest young men who have had at least a grammar school education and try especially to get men who have had two or three years of high school work but who do not intend to finish. They show greater adaptability to the work between the ages of 18 and 21. It would also be helpful if arrangements could be made to have men deliver lectures in high schools where welding is taught.

The biggest trouble with welders trained in the plant is that they are simply shown how to do the work instead of being taught the principles of the process. Apparatus salesmen stand as the contact man between the user and the

home office. It is their place to check up on conditions in the welding department and urge the proper kind of instruction.

The amount of supervision over the welders in the plant is usually determined by the amount of welding which is done. That is, if there are only a few welders it is often the case that there is nobody in charge of them who actually knows the principles of good welding. This is a mistake because competent supervision will always increase the output of the welding department and also of the welding at the same time. Therefore, in cases where there is not enough welding to justify the appointment of a high class man in charge of them at least one of the welders should be a man who is known to be a first class operator in every respect and it should be generally understood that he is to exercise supervision over all of the welding.

The salesman who misleads a customer by assuring him that welding is a simple process which requires no particular brains or ability to handle makes a mistake which eventually will react to his disadvantage. He will find that the user of his equipment judges the process altogether by the results so it is better to start him off with the kind of ideas which will lead to securing good results.

At present we have no standards for selecting operators so the supervisor of the welding department is under the necessity of giving every applicant for the position a chance to prove his worth if he shows signs of being a good man. It will be helpful to the industry if salesmen, service men and demonstrators give users of apparatus all the help they can in the selection of the type of men needed in the different kinds of plants.

One innovation which is very badly needed is a standard test for welding operators. These tests, of course, should be suited to the different types of jobs. If applicants of welding jobs knew they would be obliged to pass such tests there is no question but that they would make an effort to study their work and equip themselves for the best kind of jobs.

In conclusion, (1) the need of more intensive training is the vital one in this industry. (2) The men who have charge of the welders should by all means be thoroughly trained in the principles of welding. (3) The surest way to bring out the need for the training of operators is to have a universal custom of requiring welders who apply for jobs to pass standard tests.

What the Sales Department Should Know About Welding Wire

By J. H. Flaherty

(*Presented at the open meeting Wednesday afternoon, July 22nd*)

In order to introduce this subject, a very brief outline of several years experience as a buyer of welding wire will be interesting. In the early history of welding there were a great many different kinds of wire and a great variety of prices just as there are today. An attempt was made to be as economical as possible by using the cheapest grade of wire but it was soon found that although cheap wire would give satisfaction once in a while it was not dependable. Then a wire salesman came along who said that 10 carbon wire would do the work, so 10 carbon wire was tried with no more satisfaction. The next man's story was that 30 carbon wire would do the trick but 30 carbon wire was a long way from solving the problem. Then different types of alloy steel wire were tried with no more uniform success. It finally came to the point of working out our own salvation by experiment.

"Stills" from Mr. Russel's Scenario, "We Have With Us Today"

The wire supply salesman must be taught the difference between bunk and fact on the question of welding wire. It has been proven over and over again that ordinary wire will not give the results in welding. This is the first principle which must be impressed upon the purchasing agent who is always too much interested in price.

While it is true that the chemical analysis of welding wire is important, experience has shown that chemical analysis alone is not the determining factor. Tensile strength of the wire itself means very little to its welding qualities and, incidentally, the tensile strength of the weld depends a good deal more upon the welder than it does upon the wire.

Welding wire must be processed to give it the structure which assures good welding qualities. This structure is determined by the methods used in drawing and pickling and it is an especially important feature when the wire is to be used for arc welding. No matter how nearly alike two pieces of wire may be as far as analysis is concerned, if there is a marked difference in the structure there will be a corresponding difference in the deposited metal when the wire is used for welding.

Thus far the men interested in electric arc welding have done more work toward the solution of the welding wire problem. They seem to know more about welding wire. As a matter of fact, the structure of the wire is more important in electric welding than in gas welding.

One feature of the Convention was the amount of time for recreation and for pleasure. Mackinac offers facilities for riding, tramping, fishing, golfing, tennis and swimming. As there are no outside attractions, those who attended the Convention had ample opportunity to get their rest or recreation in the time between meetings. The register of attendance shows that quite a number of ladies were present for the trip and their entertainment was planned in detail by Mrs. E. G. Luening. When the guests prepared to depart it was noticeable that they all sought out Mrs. Luening to express their thanks and assure her that their entertainment had been thoroughly enjoyable.

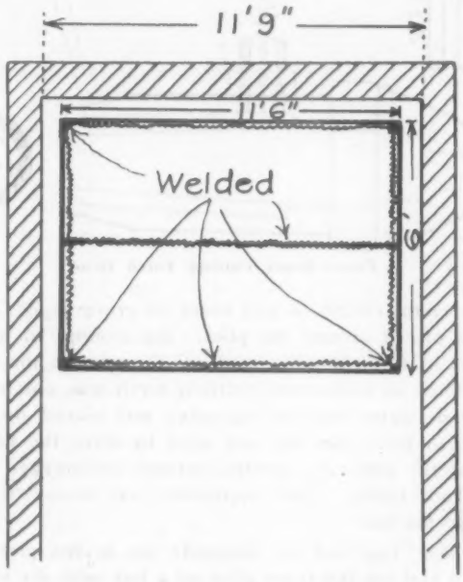
Don McCloud and David Ahldin of the Keith Dunham Company, and J. B. Green, of the Chicago Steel & Wire Company, added an unusual touch to the Convention by their diligence in taking motion pictures of the important happenings during the Convention. It is thought that these movies will be available at the Convention next winter. A few scenes are shown along with this report but many of the most interesting and exciting events have been purposely omitted in order that the complete movies may not be lacking in novelty when they are shown to the members later.

Following is a register of the attendance at the Convention: H. N. Smith, Memphis Oxygen Co., Memphis, and Mrs. Smith; E. G. Luening, Consulting Engineer, Chicago, and Mrs. Luening; F. R. Wilkinson, Logansport Oxygen Co., Logansport; W. H. Girdler, Kentucky Oxygen Co., Louisville; C. A. Kurz, Dayton Oxygen & Hydrogen Products Co., Dayton; H. B. Pearson, Burdett Oxygen Co., Chicago; R. B. Swope, Southern Oxygen Co., Chicago, and Mrs. Swope; W. A. Sherman, Magnolia Gas Products Co., Houston; Willard Foster, Tulsa Oxy-Hydro Co., Tulsa; C. T. Price, Portland Oxygen Co., Portland; J. C. Menzies, Burdett Oxygen Co., Cleveland; T. E. Bedortha, Purox Company, Denver; J. B. Green, Chicago Steel & Wire Co., Chicago, and Mrs. Green; C. Feebush, Bastian Blessing Co., Chicago; L. Campbell, Jr., United States Welding Co., Minneapolis; E. J. Lansing, Seamless Steel Products Co., Milwaukee; E. Grieshaber, Nordberg Mfg. Co., Milwaukee; R. E. Friend, Nordberg Mfg. Co., Milwaukee; G. Carlson, Wm. Wharton Co., New York; Charles Gulick, Wm. Wharton Co., New York; David Ahldin, Keith Dunham Co., Chicago; E. N. Stevens, Imperial Brass Mfg. Co., Chicago; Joseph Halla, National Gauge & Equip. Co., Chicago; Wm. Rapp, U. S. Gauge Co., Chicago; R. K. Randall, Y. M. C. A., Cleveland; C. E. Phillips, Purox Company, Detroit; J. T. Butler, Burdett Oxygen Co., Pittsburgh; A. F. Wall, Wall Bros., Detroit; E. D. Findlay, Acme Oxygen Co., Chicago, and Mrs. Findlay; A. E. Reyman, International Oxygen Co., Toledo; O. E. Engler, Balbach Company, Omaha; A. J. Russell, Bettendorf Oxygen Co., Bettendorf, and Mrs. Russell; J. T. McGaughey, Clark Chemical Co., Wickliffe; L. Bruno, Louisiana Oxygen Co., New Orleans; C. T. Allen, Gas Products Association, Chicago, and Mrs. Allen; M. L. Goodrich, Swift & Co., Chicago; W. H. Joyce, Harris Calorific Co., Cleveland; G. B. Harris, Harris Calorific Co., Cleveland; John Harris, Harris Calorific Co., Cleveland; T. F. Wettstein, United Lead Co., Keokuk; J. J. Kelley, Shawinigan Products Corp., New York; H. Booth, Shawinigan Products Corp., New York; L. F. Loutrel, Shawinigan Products Corp., New York; H. S. Card, The Welding Engineer, Chicago, and Mrs. Card; M. K. Dunham, Keith Dunham Co., Chicago; E. A. Faulhaber, Burdett Oxygen Co., Chicago; E. L. Connell, Interstate Oxygen Co., Wheeling; E. H. Smith, Smith's Inventions, Inc., Minneapolis, and Mrs. Smith; J. H. Luening, Secy., Compressed Gas Mfrs. Assn., New York, and Mrs. Luening; Stuart Plumley, Acetylene Journal, Chicago, and Mrs. Plumley; B. N. Law, Air Reduction Sales Co., Chicago; I. H. Levin, Electrolabs Co., Pittsburgh; E. L. Heyne, Chicago, and Mrs. Heyne; Dr. Paul Heylandt, Germany, and Mrs. Heylandt; A. S. Bordeaux, Michigan Oxy-Hydric Co., Muskegon; E. J. Flood, Page Steel & Wire Co., Chicago; J. J. Flaherty, Page Steel & Wire Co., New York; A. F. Jenkins, Alexander Milburn Co., Baltimore, and Mrs. Jenkins; H. O. Brunder, Pressed Steel Tank Co., Milwaukee; R. P. Dreckelman, Pressed Steel Tank Co., Milwaukee; P. C. Avery, Avery Engineering Co., Milwaukee; I. F. Fausek, Modern Engineering Co., St. Louis; A. J. Fuasek, Modern Engineering Co., St. Louis; E. L. Mills, Bastian Blessing Co., Chicago; Mrs. A. E. Nelson, Logansport, Ind.; Miss M. M. Rogan, Oak Park, Ill.; Mrs. M. B. Rogan, Oak Park, Ill.; Miss Grace Teagan, Detroit; Mrs. Van Cort, Memphis.

WELDING A TANK IN CLOSE QUARTERS

BY Z. L. EVANS

We had an order a few months ago to build a fuel storage tank for an oil burner furnace. This was an old five-story building in the business district. The furnace for heating this building was formerly fired by coal but the management decided to change to oil. The tank's dimensions were 11'6" x 6' x 5'.



Tank Welded in a Tight Place

The cellar this tank was to go in was under the sidewalk. After going in the cellar and investigating we found there was no opening large enough to pass the tank through if built on the outside. And as you see from the accompanying sketch there is only 1½" clearance at each end of the tank. The cellar being 6'6" deep under a cement sidewalk it was impossible to turn the tank over or move it.

Our only way of getting the sheets in to the cellar was through the elevator shaft. And it wasn't large enough to permit a 6' sheet to pass through. So the top and bottom sheets were split through the center.

When we got the eight pieces of steel in the cellar we proceeded to erect the tank by welding the two bottom halves together, then one of the end pieces was stood in an upright position. This had to be very accurate on account of not having room at the ends to use hammer or any tools. And a square was used to get the ends and sides at right angles. After the first end was lined up and tacked about every twelve inches the back side was put up in like manner. Then the other end was all tacked about 12" apart, and the front side put in place. On account of such close quarters it was necessary to do all the welding inside of the tank. The bottom, sides and ends were first welded. This was done before the top was put on on account of the fumes and smoke. Then we cut four pieces of old 2" boiler tubes 4'11¼" long (the tubes being ¼" shorter than the depth of tank to allow the top to fit inside) and tacked to the bottom of the tank spaced equally through the center. This held the top in place until it could be tacked and also made an excellent stiffener for the tank.

There being 18" clearance from the top of the tank to the roof of the cellar, the top was welded from the outside eliminating overhead work.

The material used was No. ⅛ Tank Steel.

The time required to build this tank was 11 working hours from the time we started fitting the tank up in cellar until it was completed. I used four men to fit it up and after that my helper and myself completed the job.

The tank was tested out with water and no leaks showed up. The time required to fit it up with 4 men was about three hours. This is about the cheapest way I know of building a tank of this kind under such conditions. For when a tank is welded air or water tight once, it is always tight.

Some Under Water Cutting Jobs

Three Cases Where Combination of Electric Arc and Oxygen Jet Solved Difficult Cutting Problems

UNDERWATER cutting jobs appeal to the cutter who likes variety in his work, because each project usually presents individual difficulties. Three interesting problems are described in the present article, all of them successfully solved by the combined use of the cutting arc and a jet of oxygen.

In the early Spring of 1925, the Schooner "Commack" of Jacksonville, Fla., while endeavoring to enter New York Bay during a severe storm, was driven onto the shoals at False Hook, just outside of Sandy Hook. Here she remained with her valuable cargo of lumber for several days exposed to heavy seas and pounding on the shoal. Eventually she was floated from False Hook and with decks awash was towed into New York Harbor by the Merritt-Chapman & Scott derrick and wrecking company.

An English Diver with Gas-Electric Torch

Divers were then sent down to examine the bottom of the "Commack" and ascertain the amount of damage done. Examination disclosed that practically all of the false keel had been torn away leaving several hundred 1⅛ inch keel bolts projecting from the bottom. These bolts varied from 3 to 20 inches in length and their presence prevented dry docking the schooner or patching the bottom preparatory to pumping The salvage problem then resolved itself into five distinct operations, namely—the removal of the keel bolts—patching the bottom—pumping out the water—removing the cargo—and dry docking.

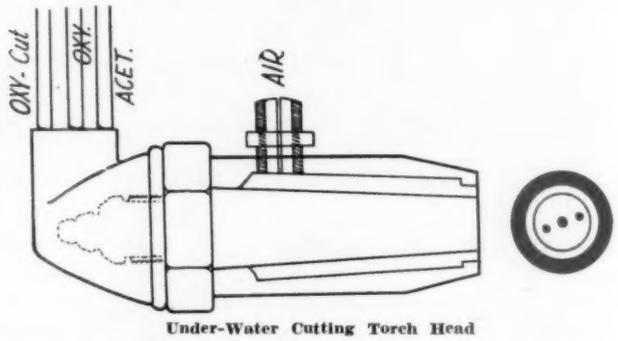
The removal of the keel bolts presented the most difficult problem and for this work the Merritt-Chapman & Scott Corporation obtained an underwater cutting torch. A portable turbo driven generator was installed on the small wrecking steamer to furnish the necessary current and oxygen was supplied from tanks. A staging was then hung under the schooner from which the divers could work and the cutting started.

It was found that these bolts 1-⅛ inches in diameter could be cut in from 30 to 45 seconds each and good progress was made. The work was done at a depth of 30 feet and the divers were handicapped in locating the bolts and shifting the stage owing to the splintered condition of the keel.

An unusual feature of this cutting job was that it was found necessary to make two contacts to each bolt. Usually in underwater cutting with the oxy electric torch one lead from the generator is grounded onto the wreck and the other lead terminates in the torch. The ground wire remains in the same place upon the wreck. This, however, is only true of metallic hulls. In the case of the wooden schooner "Commack," no contact could be made through the hull and the diver applied both ground terminal and torch to each bolt. To facilitate this work a 1¼ inch iron ring was secured to the end of the ground wire. When in position to cut, the diver slipped this ring over the end of the bolt and then applied the torch to the base of the bolt. In a few seconds the bolt was cut clear from the keel, dropped through the ring, and torch and ground were ready for the next bolt. When the bolts had been all removed a canvas patch was placed under the keel. The schooner was pumped out, unloaded, and dry docked.

Obstruction Successfully Removed

Upon completion of the piers of the new bridge over the Raritan River at Perth Amboy the Foundation Company proceeded to pull the temporary walls of steel piling. The last three piles to be pulled were spliced piles and one after the other the splices broke. This left a group of three piles in 13 feet of water and with the top of these piles about 3 feet under water at low tide. The problem was then to remove this obstruction.



Under-Water Cutting Torch Head

After several efforts to pull them en group failed, a cofferdam was placed around the piles. An attempt to pump the water out of this cofferdam and cut the piles in the dry also failed. Then an underwater cutting torch was obtained.

The underwater cutting apparatus was placed on a small tug. Steam from the tug was used to drive the turbo-generator for the necessary electric current and oxygen was obtained from tanks. This apparatus was connected up on the way to the job.

When the tug tied up alongside the bridge pier a diver descended and cut the three piles on a line with the surrounding bottom. This work was done in a strong tide and it required about two hours to clear the channel. The severed piles were then hoisted by a small derrick on the job and the foundation work on the Perth Amboy Bridge was completed.

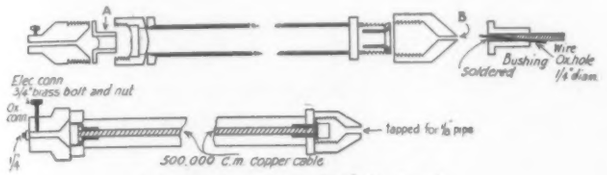
In this instance the underwatercutting torch was resorted to only when every other means on the job at the contractor's disposal had failed. The underwater cutting torch solved this problem.

This torch is available for service to engineers and contractors who have the problem of cutting steel, sheet piling, cast iron or cast steel under water.

Cutting a Three-Inch Cable

Navy Day, 1924, one of the tugs at the Submarine Base, New London, Conn., became entangled with the listening cable which was laid from the channel to the school where it is connected to listening devices used for training submarine men. This cable, which is 3 inches in diameter, has a protective covering composed of ¼ inch nickel steel strands under which is marline, lead and a heavy insulating material over the ⅝ inch copper coil.

To tow this tug to a shipyard and put it on the ways in order to remove the cable would have involved considerable expense, but as the cable did not break when it wound around the propellor and shaft it was necessary to cut the cable first.



A Home-Made Gas Electric Torch

After working for some time with hack saws without results, an experienced cutter was called in to proceed along any plans he might desire. He had a nozzle made to fit over the tip of a regular cutting torch to use it underwater. The measurements are not hard to figure out and it can be made in about two hours in a machine shop.

It was necessary to make about fourteen cuts and required about seven tanks of oxygen and two of acetylene. As each strand was cut it would spring out so by the time the cut was half through there was a mass of protruding strands that prevented cutting deeper. It was impossible to cut single strands. A second cut would have to be made about 4 inches from the first to remove these interfering strands as much as possible.

As it was impossible to use a guide on the torch in this work, much difficulty was experienced in keeping the torch from popping out when it touched the metal. No such difficulty would be experienced if an electric torch was used so the cutter went to work to design and construct one.

The outfit consisted of a 50 ft. length of rubber hose into each end of which was screwed special fittings, connected by 50 ft. of 500,000 c.m. cable. This wire must be as flexible as possible to enable the diver to use it.

The wire is first pulled through the hose until about 6 inches remains out. Two inches of this is stripped and inserted through bushing "A" and soldered. The wire is then pulled, forcing the bushing against shoulder on coupling and the process repeated on the other end. A ¼ inch hole must be drilled diagonally through the joint to allow the oxygen to pass. Both ends are painted with black asphaltum and heavily taped for insulation. The electrodes are also painted with black asphaltum and taped before the diver descends. The electrodes are made of extra heavy copper pipe, ⅜ inch O. D., ⅛ inch I. D., and about two ft. long. To change electrodes requires but a few minutes as the diver can unscrew the stub and insert a new electrode when needed. The oxygen pressure must be slightly greater than the water pressure or it will back up into the hose. This torch can be used by any welding shop having an electric cutting and welding machine.

A. W. S. FALL MEETING

Demonstrations and Exhibits to be Featured

Plans are practically completed for the fall meeting of the American Welding Society, in Boston. Three days, October 21, 22 and 23 will be devoted to the various technial sessions, demonstrations, exhibits and entertainment. The headquarters for the meeting will be at the Massachusetts Institute of Technology, Cambridge. Exhibits of welding, welded products and actual demonstrations of welding and cutting are to be featured at this meeting. It will be the object of these exhibits and demonstrations to show industrial managers and engineers what can be done. These demonstrations will start at 9 a. m. each morning and last until 5 p. m.

Five technical sessions are scheduled on important subjects. The papers will be printed and distributed in advance and the greater part of the time of each session will be given over to a discussion by those present. In addition there will be a dinner and theatre party on Thursday evening at which the ladies will be the guests of the Society. Wednesday evening will also be given over to entertainment and demonstrations.

Some of the important papers prepared for the technical sessions are:

Wednesday morning, October 21, 10 a. m. to 12 m. "Thermit Welding," J. H. Deppeler, Chief Engineer, Metal and Thermit Corporation.

Thursday morning, October 22, 10 a. m. to 12 m. "Industrial Applications of Arc Welding and Economies Effected Through Its Use." Joint paper by H. M. Hobart, Chairman, Electric Arc Welding Committee and W. Spraragen, Secretary.

Friday afternoon, October 23, 2 p. m. to 4 p. m. "Spot Welding of Automobile Bodies," J. B. Meadowcroft, General Supervisor of Welding, E. J. Budd Manufacturing Co.

A meeting of the research department of the Society, (American Bureau of Welding), will be held Thursday afternoon, October 22nd, 2 p. m. to 4 p. m. Program will include review of present activities and outline of future investigations.

HE WELDS FOR THE FARMERS

By F. R. Cozzens

Geo. H. Jackson, owner of a general repair shop out in Washington County, Ohio, is making an oxy-acetylene welder pay dividends by working for the farmers. He is located in a small town where trade is dull during certain seasons; but knowing that jobs are always waiting in the rural districts, he bought a little space in the county paper, and ran an "ad." worded thus:

> **BRING ALL YOUR BROKEN IMPLEMENTS TO WENDELL'S BARN, on Sat., Nov. 15th and let me show you what an oxy-acetylene welder can do!**
>
> **I save machinery from the junk-pile! Stop in, and see how it is done.**

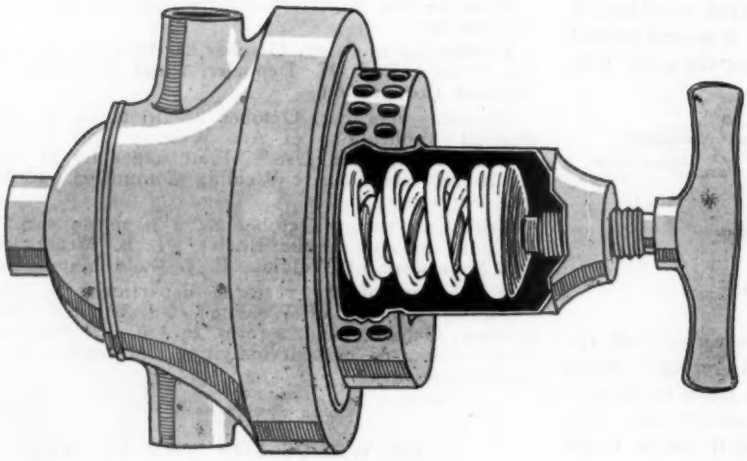
"I secured the right to three barns in various parts of my locality," Jackson explained. "And on the day mentioned, I load my outfit into a truck and drive out to one. There is always a bunch of repair jobs waiting me, and sometimes I have more than I can do. Farmers are surprised to see cogs replaced, points built up, and metal welded together like new. It makes a splendid advertisement, and during 1924, the stunt increased my business over 40%.

"I meet the farmers in their own community, saving long hauls into town and this wins trade that could not be had in any other way. Most of them have an accumulation of old machinery about the farm which can be put into running condition with but very little cost; and this is where the welding outfit builds business. For this reason, I give special attention to building up old-model implements for which repairs can no longer be bought.

"I let folks watch the welding process, explaining the work as I go along. This causes comment, and gets them interested in the job.

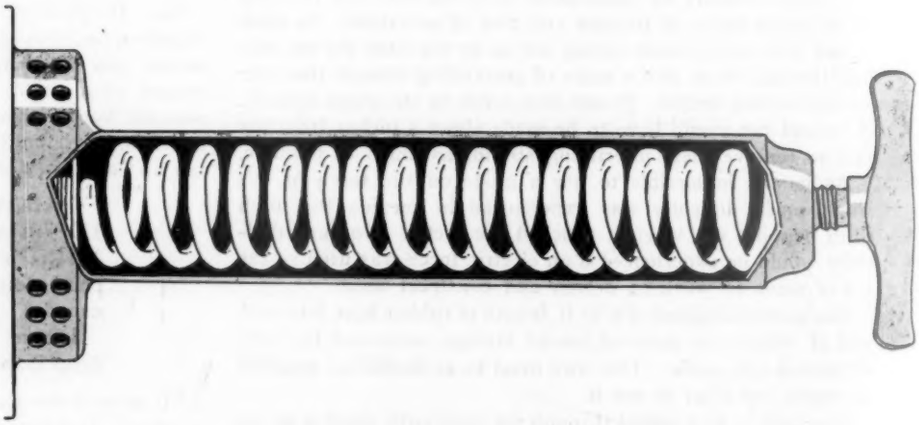
"Drives into the country are made four times a month, and advertised a week in advance. They are arranged at any season of the year, with very little expense; and each trip so far, has repaid the cost with a nice profit besides."

The REGO Double S



The Rego Regulator showing the patented Rego double spring.

To have the same sensitive control, regulators with only one spring need a spring and bonnet about four times as long as the Rego construction.



REGO SALES SERVICE REPR

Syracuse, N. Y.	National Welding Equipment Co.	517 E. Water St.
Louisville, Ky.	Kentucky Oxygen-Hydrogen Company	Logan St. and Gross Ave.
New York, N. Y.	Weldox Equipment Co.	359 W. 52nd St.
Dallas, Texas	Southwest Welding Supply Co.	209 S. Pearl St.
Kansas City, Mo.	Western Welding Equipment Company	308 E. 17th St.
St. Paul, Minn.	St. Paul Welding & Manufacturing Co.	174 W. Third St.
Portland, Ore.	Welder's Equipment &	Co

The Bastian-Bles

246 E. Ontario St reet

Spring—

1. Stops that fluctuation in the torch flame.
2. Accurately controls the flame at low pressure.
3. Supplies a large volume at high pressure.

In Rego Regulators a wide range of sensitive control is achieved by a patented double spring. This spring within a spring assures the user of a constant supply of gas at his torch, whether a large or small tip is used. The light spring takes care of low pressures and the heavy spring controls high pressures.

Competitive regulators with one spring would have to have a spring and bonnet about four times as long as Rego construction to obtain the same sensitive control.

Be sure to use Rego Regulators. Their superior construction assures you of a constant volume of gas at your torch at an even pressure. Your torch will do better work and you will save gas and time if your regulators carry the Rego trademark.

VICE EPRESENTATIVES

Los Angeles, Calif.	A. W. Courtney	441 Douglas Bldg.
San Francisco, Calif.	Stuart Oxygen Company	215 Bay St.
Seattle, Wash.	A. C. Eck Company	914 First Ave. S.
Butte, Montana	Mountaineers Welders Supply Co.	
Seattle, Wash.	Ferrofix Brazing Co.	816 First Ave. S.
Toronto, Canada	Carter Welding Co. of Toronto, Ltd.	165 Adelaide St. W.
Co.	91 North Second St.	

lessing Company

Chicago, Ill.

Comparison of Welding Methods*

For Each Process There Is a Field Where It Undoubtedly Excels—Many Jobs Can Use Either Method

By C. J. Holslag†

GAS welding, electric welding and thermit welding each have their exclusive capabilities, and, as such have each an appropriate place in the welding industry. Each is capable of accomplishing some particular operation better than another method. On very thin work, for instance, the process of gas welding may be used to great advantage because of the relatively small amount of heat used and because a finished surface may be produced in a single operation. For heavier work, electric arc welding is the generally adopted method because its high concentration of heat enables the welding operation to be performed with the presence of minimum heat strains in the large mass of metal. For very heavy work, the thermit process usually works out to best advantages, because the necessary cost of building jigs and molds is more than offset by the economy gained by the deposition of so large an amount of metal.

No Definite Limits

It is not possible to say, however, that the limit of any certain process is reached at any definite point. It is largely a matter of economy, of adaptability and of convenience when the use of one method will supersede that of another. If we pay close attention to these points we may perhaps be able to determine definitely the real capabilities of a given method of welding. It will suffice to show how this is done by discussing examples taken from each process.

Gas Welding Leaves Smooth Surface

Consider the case of the welding of metal furniture, and other "show" pieces of a like nature. In the long run, production of these pieces by the electric welding process would no doubt be cheaper, but because it is capable of smoothing off the edges as the welding proceeds, the gas process is usually given preference. Yet, on heavy work, the gas process must inevitably defer to that of electric arc welding, because the electric method can show much greater economy in costs, time and results, together with a maximum of convenience. No matter what the thickness of the work, the electric process is easy and cool, but for very heavy work, especially on cast-steel sections, the thermit process excels. This is because, as has been stated already, the very bulk of the melted metal is sufficient to warrant the care required to make this method operable. Thermit fusing has now been successfully applied to the welding of cast iron, chiefly because the pioneer work of other methods in this field have shown that such welding may be easily accomplished if careful and methodical compensation is made for the laws of expansion and contraction.

Steel Studs Distribute Stresses in Cast Iron Arc Welds

In this connection the electric arc method would seem to show to greatest advantage, because the method of the small and highly-concentrated unit bead deposition passes so little heat into the body of the work that the expansion and contraction strains are usually negligible or are easily accounted for. Thus warping is easily prevented. This is found especially applicable in cast iron work, where these strains develop so quickly and unexpectedly. In very heavy cast iron work, it may be necessary to resort to a judicious distribution of steel studs about the welding junction. This is not by any means to strengthen such a weld, but rather to provide a means for quick distribution of the stresses while the weld is being made or is cooling. These studs, as a matter of fact, form an avenue of escape *into the weld itself* for the contracting and expanding stresses, and this type of weld is completely capable of absorbing these strains.

Avoiding Hardness in Cast Iron Welds

Yet, according to the definition of gas welding enthusiasts, neither the electric nor the thermit processes may be classified as capable of producing a satisfactory weld in cast iron, because the weld itself is apt to be hard. The thermit process produces a steel alloy weld in the cast iron; the electric process a pure steel weld. Each of these will be more or less hardened, because of the peculiar property of cast iron, which tends immediately to withdraw the heat from the weld and to produce thus a chilling effect. This hardness will be found in and through the cast iron thermit weld, and underneath the bond in the electric weld. In spite of these objections, however, the majority of cast iron repair jobs accomplished by both of these methods turn out to be thoroughly satisfactory, both as to performance and economy. The electric arc method has recently taken a step forward in the perfection of the nickel-manganese-copper electrode, which is capable of depositing a cast iron weld which may be machined cold. These electrodes of course are more expensive to use than electrodes of the ordinary type, but the results they produce are amply justified from the point of view of economy. With relation to points of performance and costs such as this, it is sometimes worth while to

*Paper presented at the spring meeting of the American Welding Society, Boston.

†Electric Arc Cutting & Welding Co., Newark, N. J.

inquire into the workings of a process with the greatest care, for mistaken ideas frequently seem to be upheld by superficial facts. The operation should be considered from the viewpoint of ultimate, not immediate economy, and in this light, unexpected results are sometimes to be found. In gas and thermit welding, the necessary auxiliary supplies required are often so "played up" that they seem to become of primary importance, whereas this applies only to the ultimate results of the process. It is a mistaken idea to believe that because the quality and quantity of the apparatus and supplies used in a process are widely touted that the process itself is capable of superseding any other. This is not always the case. It is usually the direct and simple operation that achieves results, and a great quantity of apparatus and supplies does not always insure the successful outcome. For instance, in a great many examples of gas and thermit welding, the supplies required provide the main source of advertising, exploitation and profit, whereas under the same circumstances electric arc welding receives but little attention, simply because it is capable of accomplishing the same results unostentatiously and requires a very small amount of power from the line and few auxiliary supplies.

Field for Automatics

The field of automatics arc welding has heretofore been somwhat restricted, because of the fact that expensive jigs and fixtures were necessary for its use. The process, however, is best and most successfully applied in plants where large production of a single type is practised. In cases like this, automatic electric welding has widened the field of the arc more and more by taking some of the thin production work away from gas. In its present development, however, the automatic arc cannot accomplish the welding of heavier or irregularly-shaped pieces economically. A most efficient process for the joining of thin sections, however, is the resistance method of welding. This method undoubtedly excels on very thin sections, but the best way to judge which method is preferable is to consider whether the amount of work is large enough to justify the purchase either of the resistance or the automatic outfit. If there is heavy production all of a similar type, it ought to be easy to determine whether it will pay to spend the money to install the necessary apparatus. In general, it is safe to state that the resistance method is preferable for very thin sections, and the automatic arc for the "border-line" sizes, that is, the sizes around No. 16 gauge. Butt or spot welding is a well-known type of resistance welding, and may be said to be so obviously a competitor of riveting that, as such, it is quite unnecessary to compare it with other methods.

Thermit Welding

Thermit welding may be used in the joining of any large pieces, and its economy in this connection has already been considered. This process, however, has an exclusive feature which should be considered here, namely, that of an effective heating agent. A notable example of this property is found in the welding of comparatively small pipes through heating the edges by means of the thermit reaction, and then employing pressure to effect a true plastic weld. For work of this nature on small pipes it would appear that the thermit method is supreme, but for the welding of larger pipe sizes, either the electric or gas processes may be employed, depending upon their respective relative costs, as before.

A Good Weld is a Good Casting

In closing, it should be noted that, with the exception of the specific thermit reaction noted above, a weld made by whatever process is nothing more or less than a cast link. If any weld is treated as such, it cannot fail to give ample satisfaction, but the weld is a casting, and as such must not be considered the equal of the rolled and treated plate to which it may be joined. A fusion weld intelligently made will satisfy every requirement as to strength, fatigue, and general physical properties, but it should always be treated as a good grade of *casting*.

A HINT ON PREHEATING

I am contributing a quick, easy and convenient way of making and handling charcoal for preheating work in a forge, I use charcoal for this purpose on account of its cleansing effect on the castings.

I use an old welded steel oil barrel with one head cut out or any other old, welded or riveted tank with one open end. I settle it firmly to prevent tipping with the open end up and build a fire in the bottom. Then I pile in all the old brush and scraps of wood I can as fast as it will burn and fall to coals. The layer of coals should be kept constantly growing without time to go to ashes. When this layer has piled up until the barrel or other container its full, quench with water, being sure to pour on enough to penetrate completely to the bottom of the barrel. When the barrel has cooled off, I set the whole thing in the shop and use directly from it, saving handling. This charcoal is usually too fine for burning in a pile but is splendid for forge use and very cheap if one has access to a lot of waste brush. I bury castings in a pile of this charcoal for annealing. If a container like the barrel is not at hand a hole in the ground will answer and the charcoal after quenching can be raked out and sacked. C.R.V.

SMITH'S INVENTIONS HOLD EMPLOYEES' PICNIC

On Saturday, August 1st, the plants of Smith's Inventions, Inc., and the Commercial Gas Company of Minneapolis, were shut down and the employees enjoyed themselves at their annual picnic. The picnic was held at Mr. E. H. Smith's summer home on the St. Croix River. The 250 men, women and children attending the picnic report they had a royal good time.

The fun began with a ball game in the morning and ended with a dance in the evening. The afternoon was given over to races and contests, the most entertaining of which were the "comfortably plump" ladies race, greased pig and chicken chasing contests. In the greased pig chase, two young porkers were turned loose and became the property of the persons catching them. In the chicken contest, six laying hens were turned loose and were eventually caught by the married women. It was women against chickens and it was impossible to determine which side made the most noise.

The only fatalities were some sun-burned faces and arms, a few cases of "chiggers," and,—among the children—one or two instances of old-fashioned bellyache.

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The Welding Engineer does not publish in its news or advertising columns any matter that deals with or refers to either personal or legal controversies.

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A Real Boost for Welding

A WELDING wire service man thought that a certain metal product ought to be welded instead of riveted, but none of the manufacturers of this product were using welded joints. They thought it couldn't be done. Finally this service man was able to interest one of the manufacturers, but the latter had no apparatus, so a good apparatus salesman was put in touch with the prospect, and made a sale. Right away trouble began. It was not an easy matter to get a new process working smoothly in a plant where it was unknown. But the young man who started this was on the job day after day, in overalls, helping his customer over the hard spots and giving the welder the benefit of experience gained in other plants. The troubles began to disappear, and the welding department began to grow important. Now the plant manager is looking forward to the purchase of more welding equipment and to the day when "we will use little or no riveting." One man's interest in extending the use of welding has made a customer for his own house and for an apparatus manufacturer, and has opened up a new field for welding. This is the kind of boosting that helps the industry. Let's have more of it.

Welded Joints are Simpler

BY adopting simplified standards of manufacture, nine groups of industries were able to report a saving of more than three-fourths of one billion dollars annually, according to a recent report. This may serve to show the importance of welding in the metal working industries, as a manufacturing process alone, because welded joints are undoubtedly simpler in design than any other type of joint. Wherever they replace old fashioned methods a definite contribution is made to the economy program. Conferences are reported to be in prospect for September for the simplification of sheet metal ware, an industry where welding is fast becoming recognized as an indispensable aid in production. Is it not going to be possible to make welding work hand in hand with these other forces that are bringing about a gradual but noticeable reduction in costs?.

Good Workers Make Good Welders

EMPLOYERS ought to realize that the best kind of training is virtually wasted on a workman who does not take an interest in results and how to get them. Many plants have splendid welding departments which have been built up by using picked men, and many others have a big turnover of welders because they insist on hiring men the other fellow has trained. It stands to reason that if the other fellow has trained a good man he's going to keep him on the job as long as conditions permit. Some plants develop welders with astonishing ease, getting them on the job in a few weeks. This can be done with the right kind of men.

When good training cannot be given in the plant it is worth while to send good candidates to a reputable school. In fact, many companies send their foremen and superintendents away for this training, to equip them for better supervision of welding operations. A few weeks ago a workman for a large company met his superintendent in a welding school classroom. The former had taken a leave of absence and studied the work at a personal expense of several hundred dollars. He is in line for rapid promotion because he applied himself to the work in order to get a return for his investment. And his employers have seen an example of what it takes to make welding successful.

Checking the Welder at Work

AN experienced gas welder suggests a method of determining whether a welder on a steel job is getting good fusion. If the rod slides easily and smoothly in the puddle, the fusion is probably good. If the rod seems to be sticky and moves with a jerky motion, the fusion will not be good.

From its own factory in Indianapolis thousands of new cylinders are shipped each year to its 31 plants manufacturing

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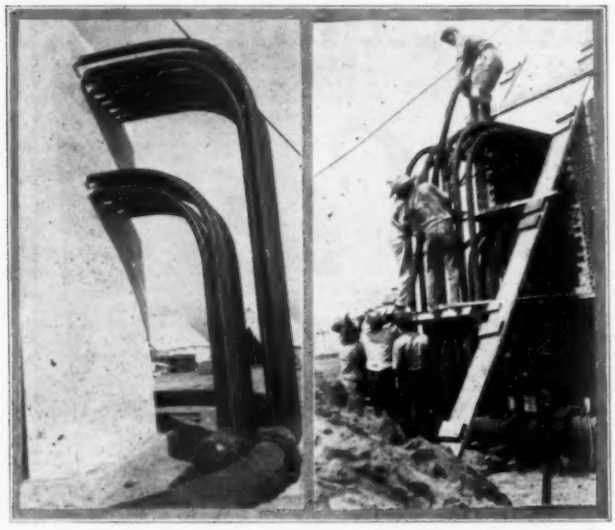
Welded Oil Heaters

Construction Details of Tubular and Furnace Type Heaters Constructed Entirely by Welding

ONE cause for the great popularity of the gas welding process in the oil fields and refineries is that it makes possible the fabrication of necessary equipment from materials on the ground, without the expense of ordering a great many different shapes and fittings, and the delay of waiting for them to be delivered to the job. In the present article there are reproduced a series of photographs which illustrate the construction of two types of oil heaters by a large oil company in Mexico. The ingenuity of the engineer in charge and flexibility of the welding torch furnished an easy solution of the problem of heating with oil.

One of the heaters is of the tubular type. The shell consists of four lengths of 30-inch pipe. The ends of each section were beveled before welding and then were butt welded together in a continuous shell 80 feet long. The only difficulty



End View of Heater — Putting In Bends

experienced in joining these sections was in getting them to line up nicely at the ends. This is a difficulty which could have been avoided because it was due to the ends having been conisderably flattened by throwing them down when unloading. Two screw jacks were used to press them out to a perfectly round shape again.

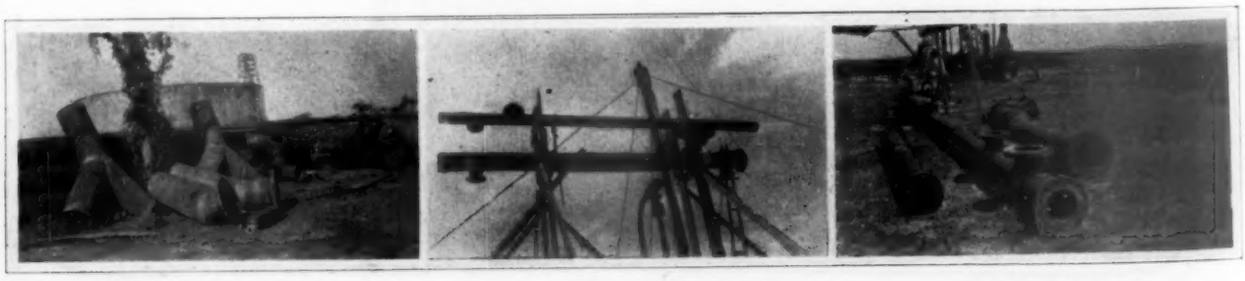
The flues inside the heater were made of 16-foot lengths of 1½-inch diameter pipe. Five of these were butt welded together to make a complete flue. On pipe of this diameter it was found that there was no necessity for beveling, as a perfectly satisfactory weld was secured by simply butting them together. These flues were arranged in series four rows high and seven wide, as shown in one of the sketches. At the outlet a trap is used to catch the condensed water.

As to the efficiency of this heater, the engineers report states that 30,000 barrels of crude oil were raised from 120 degrees to 175 degrees F. in a period of twenty-four hours, consuming just a little over 100 horsepower. Altogether the

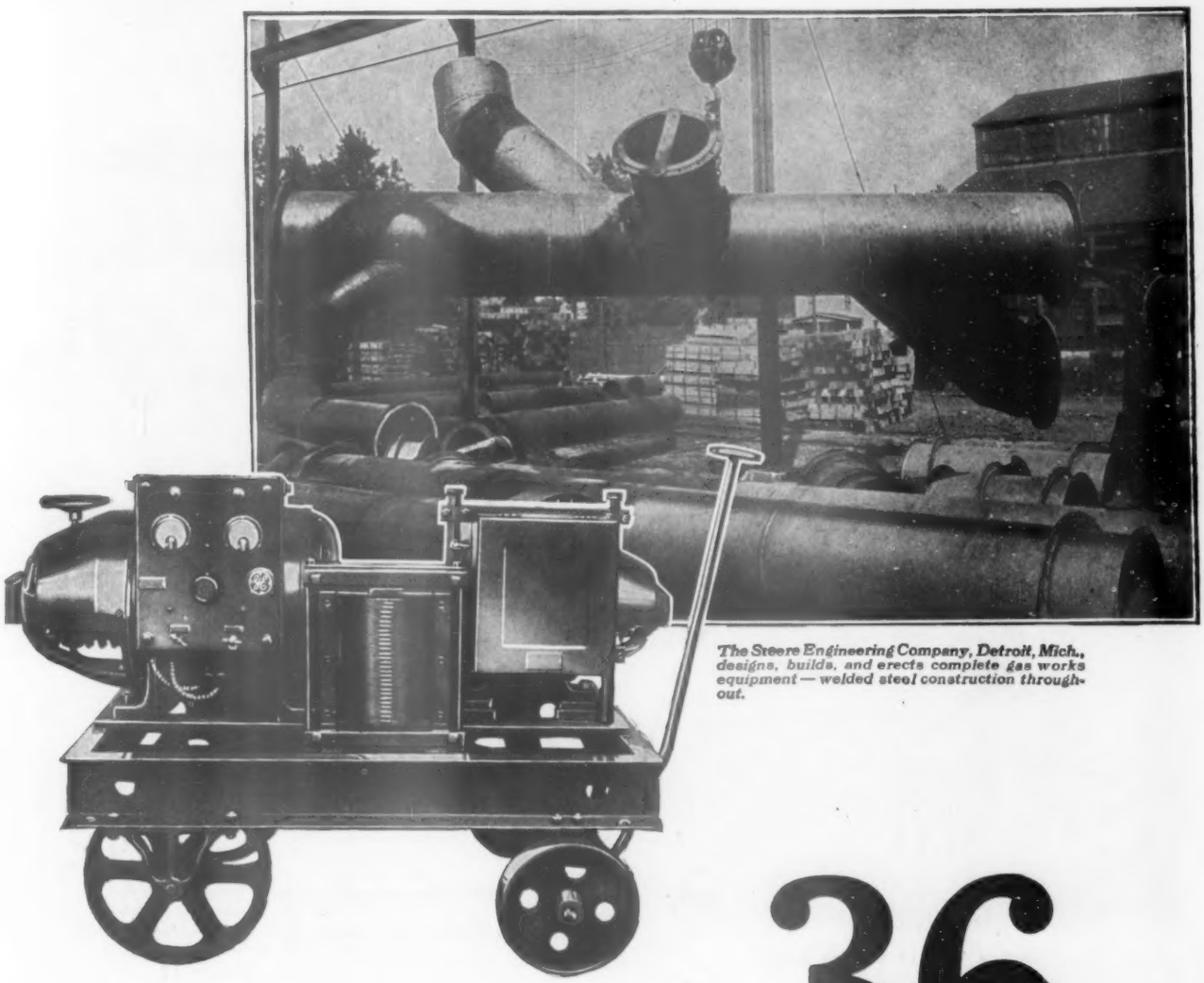
Above—Expansion Bend for 10-Inch Oil Line
Below—Pulling 30-Inch Pipe Into Place

heater was claimed to work with complete satisfaction, although there are some drawbacks to the necessity of using live steam for the heat.

In the photograph which shows a view of the completed heater there are some specks visible on the side. These mark the location of supports for the flues which were welded in every ten feet. They were not placed exactly over one another but staggered about twelve inches. Some difficulty was experienced at first in getting the tubes in position because the long lengths were quite flexible and had a tendency to stick behind every support. One of the sketches shows how this difficulty was overcome by ramming a wooden plug into the tube. The plug being turned up at one end slipped easily over the supports. When the tubes were all in position the ends were cut at a 45-degree angle with the cutting torch and square return ends welded on. In the foreground of one of the photographs there is visible a reducer made by welding, which was made necessary because of the fact that the heater serves as part of the flow line.



Welded L's and V's — Outlet Headers — Headers and Offsets



The Steere Engineering Company, Detroit, Mich., designs, builds, and erects complete gas works equipment — welded steel construction throughout.

Steere has 36

Commenting on the service of G-E Arc Welders, Mr. Steere says, "With G-E Arc Welders we are able to cut construction costs and at the same time make better looking jobs. Welded joints are absolutely tight and last longer. The ease with which these G-E Welders could be moved about and their ready adaptability for various forms of service, also account for their favor in our organization."

Thirty-six G-E Arc Welders are fabricating such shapes as the one shown for the Steere Engineering Company. Only G-E Welders are used—the selection came after a thorough trial.

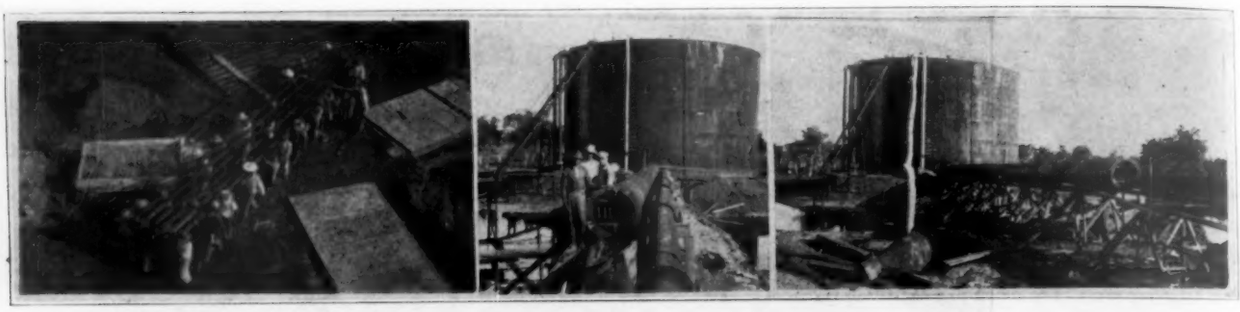
In this case arc welding makes a neater job through the elimination of joints and fittings, and a construction which is much more dependable. It is typical of the developments G-E Arc Welders make possible.

Wherever metals are to be joined, built up, or cut down, G-E Arc Welders will do the job most efficiently. For your convenience Arc Welding specialists are located in every G-E sales office.

16-12

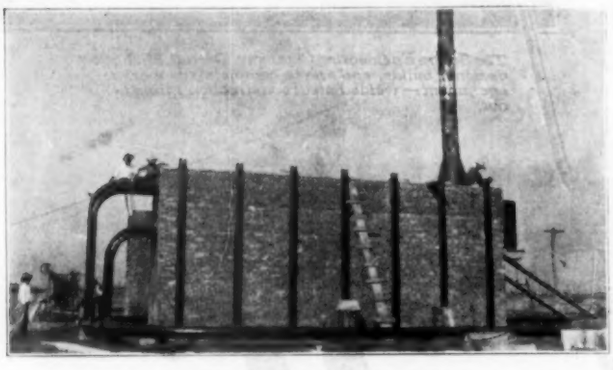
GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N.Y., SALES OFFICES IN ALL LARGE CITIES



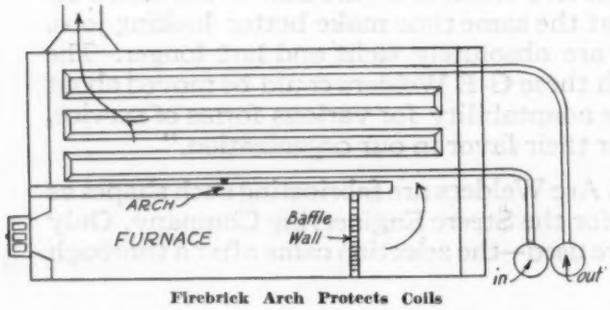
Carrying One of the Coils | Tubular Heater Complete | Welded Reducer (30 to 16)

A considerable portion of the work done by this company is straight pipe welding, consequently the secret of getting perfectly satisfactory results is simply a matter of having an operator who is not only a good welder but also a skilled welder on pipe shapes. The term "good welder" is used to indicate an operator who understands what he is supposed to be doing, who is always careful to make his weld penetrate clear to the bottom and make perfect fusion as he goes along. It requires a long experience to make perfect welds on curved surfaces and the kind of work required on oil field jobs gets a man into some very tight places.



Complete View of Furnace Heater

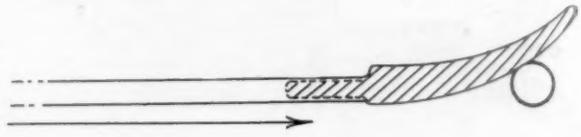
The engineer in charge of the construction of this tubular oil heater gives the following description of the method of assembling: "I had the top and bottom rows sticking out a foot outside of the 30-inch pipe. Then we welded the header

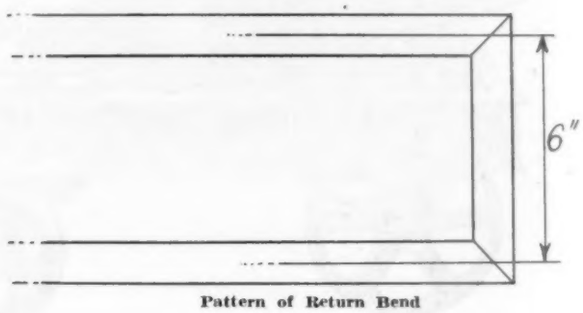


Firebrick Arch Protects Coils

pushed all together back into the casing and welded the inlets and outlets on the heater. After that return bends were welded on the back end. The time of construction was about three weeks, using one welder and from two to fifteen laborers as required. The laborers were Mexicans. About fifteen tanks of oxygen (220 cubic foot capacity) were used."

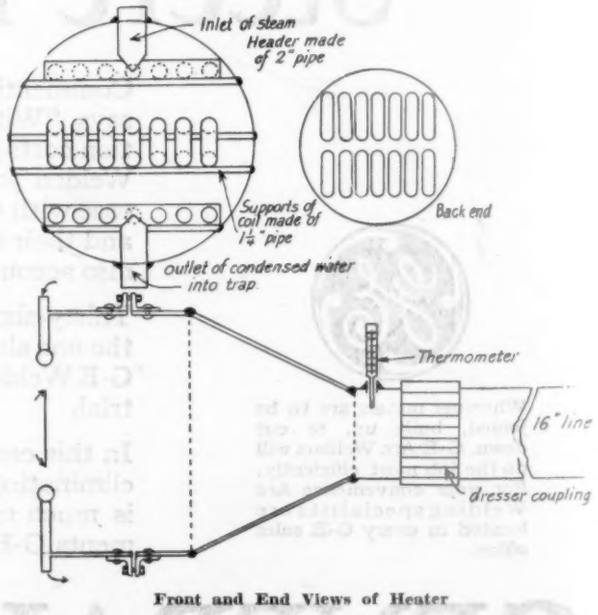
A furnace type of heater was also constructed by the same crew. This heater is fabricated of 3-inch pipe. No reports have been made of their efficiency because they have not been put into service. It is planned to use heaters of this type only intermittently during the rainy or cold seasons. The coils are 30 feet long and each one consists of six pipes connected by rectangular welded return bends. 3-inch seamless





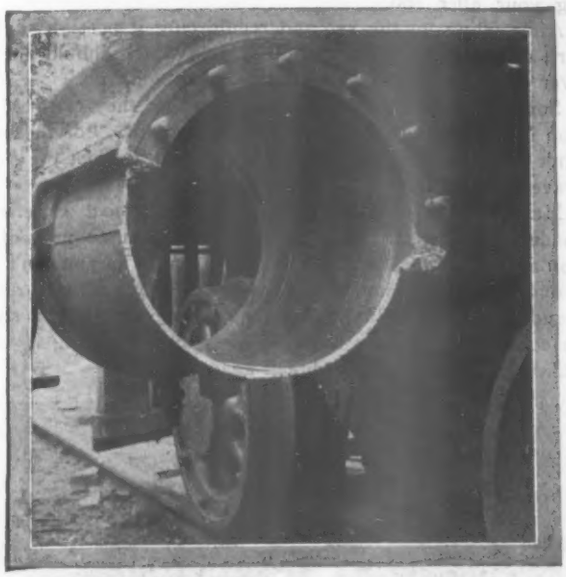
Pattern of Return Bend

tubing is used for the coils. The top view and end view sketches reproduced here indicate the manner of connection between the line and the coils. This header was the most



Front and End Views of Heater

difficult part of the job because the bends were so close together. In order to locate properly the holes that were to be cut a complete pattern was made and placed over the 10-inch



Welded with Tobin Bronze without Dismantling

This type of repair to a locomotive cylinder formerly necessitated dismantling the cylinder and pre-heating the casting before the weld could be made.

By using Tobin Bronze, the broken flange was welded in place at a dull red heat, with the Oxy-Acetylene flame, without dismantling the casting, at a great saving in time and expense. And the weld is stronger than the original cast iron.

Tobin Bronze Rods, an exclusive product of The American Brass Company, can be secured from leading Distributors.

Descriptive pamphlet, including table of weights, melting points, also suggestions for welding with Tobin Bronze, sent upon request.

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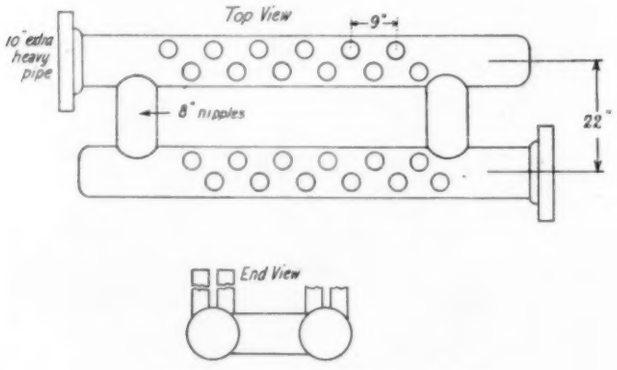
WELDING RODS

pipe. The two 8-inch nipples, which are shown between the headers, were used only to make the whole affair strong and rigid and do not form any part of the flow line. In front of the heater the inlet and outlet lines cross each other with long curves to allow for the movement caused by expansion. The burners are Dahl mechanical burners. The fire brick arch in the heater keeps the fire from touching the coils. In the construction of these coils the tubing was all beveled and butt welded.



Header for Connecting Lines and Coils

Several of the photographs included with this story show how the torch is constantly being used in the construction of ells and ys, headers, reducers and offsets of all description. In lots of cases one of these pieces of work is a complete story in itself of a real accomplishment in the saving of time and money.

DOES IT PAY TO RECLAIM LARGE CASTINGS?

The answer is "Yes." We have here a picture of a casting being welded, which was turned down by one welding shop on account of lack of confidence. The boys in the picture put the job over in such a way that it stayed put. This particular job is a shear casting which cost $275.00, f.o.b. factory, plus $40.00 freight, which equals $315.00. The cost of welding including labor, overhead expense and all material was $60.00, so you can easily see the saving.

This casting has been in constant use for over six months without a sign of defect. To test this casting after setting it up they sheared the same piece of plate iron all to pieces, which had broken it originally. Mr. Pallady is the man who took charge of the job. You see him welding on the right.

This is the way such jobs are handled. First lined up in proper place, then tacked. Then the kerosene torch is applied to get up heat. After the casting has acquired quite a heat the vee is melted out, which heats the casting considerably more. The vee should be melted nearly through.

The welding operation is now ready to begin. It is always advisable to use two torches on a large casting, as you can hold your heat with a much smaller flame. Too large a flame blows your metal. It also sags or burns your deposited metal. When using two torches, each operator should work from outside to center. If the casting is not too large you may turn off your kerosene torches when you once get up heat as two torches will furnish plenty of heat.

For the benefit of those who have not had the experience on cast iron, use your welding torch with a large top. First apply a neutral flame until metal begins to flow then cut your acetylene down to an oxidizing flame. Your cast iron will flow very fast with this method. When filling up your vee be sure that your casting is puddling all of the time as it is necessary to puddle your filler rod into the casting to obtain a proper weld.

If you should lose your heat to where your cast is no longer properly puddling, stop depositing your filler rod and start your kerosene burner again. Also keep your torches going until proper heat is once more obtained then continue depositing your filler rod.

After filling up the vee and reenforcing if possible, quickly turn over and finish up the other side which should not lack over one-half inch of being welded through.

Some welders are skilled enough so that they can hold cast iron into place with no bother, others cannot. For those who can't it is necessary to prop a fire brick up against the side to prevent metal from running out of vee.

Mr. Pallady is among the oldest and most experienced welders in the west. He says never to break up chunks of cast iron and throw in a weld that needs strength as you can't weld properly in that manner. Also use plenty of some reliable brand of cast iron flux, and after welding a casting it should be covered up to keep the cold air from hardening it, which makes brittle and easy to break again.

This Weld Saved $255.00

Notice in the picture these men are ready for business, chain placed to turn casting, water to cool torches, tanks set back away from heat and hoses behind them for safety. Most successful welders are careful. M.R.L.

LINCOLN PLANT TRIES UNIFORM VACATION

The Lincoln Electric Company plant and office in Cleveland will be closed for a two weeks' period, starting August 3rd, to permit of a uniform vacation for all the factory and office employes, according to an announcement of Mr. A. F. Davis, assistant to the vice president. This plan of the firm is a new one, and provides for the maintenance of only sufficient staff to give service during the two weeks' on rush demands for welders and electric motors.

"We are trying this vacation plan this year in the belief that it will make possible better service throughout the year to our trade and at the same time insure all of our people having a like opportunity for a rest," says Mr. Davis. "The plan has been used already by a number of other manufacturing companies and there is every indication that it will spread throughout industry."

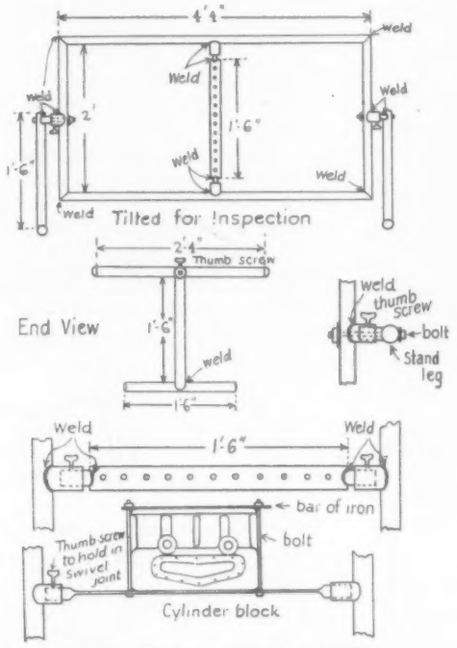
Thompson Electric Welding Company of Lynn, Mass., recently arranged for direct representation in Philadelphia by Wm. T. Ober with headquarters at 2006 Market Street.

The Gibb Welding Machines Company of Bay City, Michigan, announce the appointment of Arthur Jackson, 32 Glenholme Ave., Toronto, Ont., as sales representative for Ontario and eastern Canada.

Improve the Shop Equipment

Several Useful Shop Accessories Easily Made from Scrap Materials in Spare Time

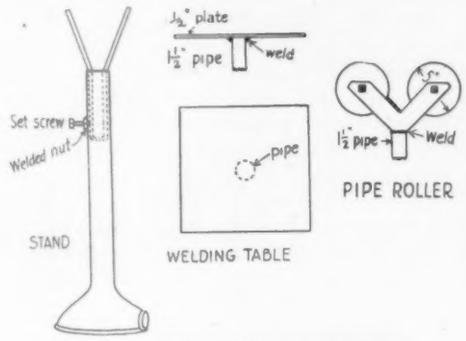
SPARE time in the shop can be used to turn junk materials into a variety of labor saving shop devices whose cost is extremely slight compared to their usefulness in handling parts that are to be welded. Take an old Ford differential housing for example. It is easy to get one from a salvage company or even a dumping ground. Cut it off just where the brake drum starts to flare out, set it up as shown in the drawing, and it makes a neat little stand. With the addition of the V-shaped attachment made from strap iron, it is just the thing for holding pipe. For lining up pipe, two or three of these are necessary. Where there is a steady run of work on pipes and shafts, the welder wants rollers, and the sketches tell a simple way to fabricate these. Two v-shaped pieces are cut from half-inch boiler plate, and two rollers of the same material, the size depending upon the size of the work usually brought to the shop. Drill a $\frac{9}{16}$" hole exactly in the center of the rollers and bolt them in between the v-plates with half-inch



Tilting Table for Preheated Jobs

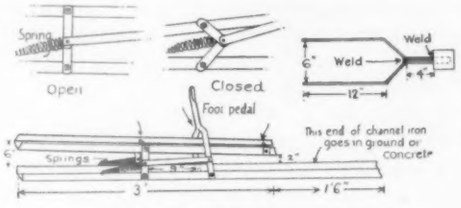
bolts. Then weld a foot of one and one-half inch pipe on the point of the V and the roller is completed. For handling a lot of small jobs, the stand can be made into a small table by cutting a square plate of the desired size, welding a short length of inch and a half pipe directly in the center, then slipping it into the housing tube.

Another set of drawings shows how to make a tilting table, which is a great convenience in welding such pieces as cylinder blocks and crank cases which have to be preheated and welded at difficult angles. Whenever preheating on small parts is necessary they can be arranged on this sort of a table so that the welding is at the most convenient angle, then the firebrick furnace built around them. To make such a table, use suitable lengths of 1½-inch pipe. The first sketch in the drawing shows it tilted upright, and gives the necessary dimensions. The corners are formed by cutting the pipe at a 45-degree angle and butt welding. Then weld a 3-inch nipple on the outside of each end directly in the center. Round out the nipples on the end so they will fit over the pipe when put in place. Then weld two on the inside of the frame, as shown. The plate reaching across the center, to which the object to be welded is bolted, may be made of ⅜" strap iron, and will have half-inch holes drilled and spaced about an inch and a half from center to center. This plate is mounted by means of one-inch nipples, two inches long. If very much preheating is to be done it will be handier to have the legs no more than eighteen inches long, but some will prefer to have it



Uses for Ford Differential Housing

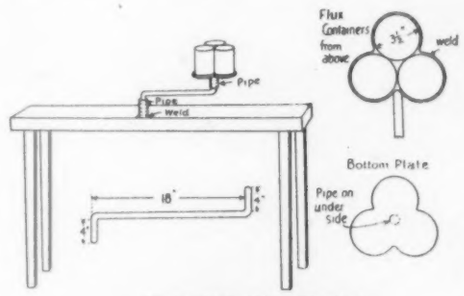
much higher. Cut the legs to whatever height is desired, then weld 18-inch base across as shown in the end view. The swivel joint comes next. Weld a one-ince nipple four inches long at a ninety degree angle from the legs, and about half an inch from the top. Slip the legs into place and drill a $\frac{9}{16}$" hole directly through the center so that the swivel joint which holds the legs



Foot Vise Made of Scrap Iron

in place can be bolted together. Next drill and tap out for a ⅜" thumb screw in each swivel joint. It is a good plan to make a second plate with holes drilled to correspond with those in the strap in the table, so that cylinder blocks and crank cases can be clamped to the table.

A foot vise, for holding pieces to be welded or finished off after welding, is another great convenience, even if there is also a



Convenient Flux Holder

regular bench vise in the shop. The sketches in the third drawing give the details necessary for building a vise from ordinary channel iron. Use two pieces of six-inch channel iron, one 4½ feet long

and the other 3 feet long, the two smooth sides forming the vise jaws. Get two pieces of 1½ x ⅜ strap iron and drill ⅜-inch holes one inch from ends in the center. Weld these pieces on 18-inches from the end of the long channel iron. These must be welded so that the flat sides of the channel iron will match. Also, the strap irons must be directly opposite, and at a 90-degree angle. The bottom should be left open about two inches. Cut four pieces of strap iron 1½" x ¼" x 5". At one end of each of these drill a ⅜" hole one inch from end to center of hole and a similar hole on the other end, ⅝" from end to center. Next cut two strap irons 1" x ¼" x 10". Countersink the holes which were drilled ⅝" from the ends of the two five-inch strap irons, and rivet these loosely to one of the ten-inch straps, so they will work freely. Be sure that both countersunk rivet holes are on the inside. The foot lever is made of 1¼" x ¼" material, with a pedal 4" x 4" welded to it as shown. The drawings indicate the assembly clearly. Use springs strong enough to raise the weight of the foot lever and open the vise.

To keep welding fluxes within reach and out of danger of spilling calls for just such a device as is shown in the fourth drawing. This is made of a length of round bar iron, five pipe nipples, and a piece of boiler plate. With these assembled as shown you have a container for cast iron, bronze and aluminum fluxes. The dimensions and specifications given for all of the above devices can be changed to suit the materials available. They are taken from actual measurements of these devices in use in different welding shops.

R. L. M.

MAKING DAVY JONES' LOCKER PAY DIVIDENDS

How Frederick D. Swank, of Seattle, Converted the Tanker "Alden-Anderson" from a Total Loss Into an Industrial Asset

One of the most spectular marine fires in recent years was that of the Associated Oil Company's tanker "Alden-Anderson", which caught fire from an explosion in the hold tied up at her dock in Avon, California, a few months ago, setting fire to the docks and drifting out into San Francisco Bay where she finally stuck on a sand bar and sank, leaving her aft end only above the water.

Several lives were lost in the explosion and fire and the tanker was regarded by her owners as a total loss. The heavy steel sides of the ship crumpled and collapsed under the intense heat, as shown in one of the accompanying illustrations, and her ¾-inch steel plates melted.

Ancient mariners looked her over and shook their heads; experienced salvagers looked her over and gave her up. She was, to all appearances, a completely hopeless wreck.

But to the man of courage and vision even the "hopeless" salvaging job is full of possibilities and such a man appeared on the scene in the person of Frederick D. Swank, of Seattle, who bid in the wrecked ship for $75,000.00, and has now about completed the task of cutting her up, and getting her out of the channel.

Dynamite and expert divers lossened the plates under water and the upper structure has been cut into pieces with cutting torches.

The large pieces are being sent down to Oakland, where Learner and Rosenthal are cutting them into charging box sizes with cutting torches. When a sufficient tonnage has been cut away from the upper structure, the remainder of the bulk will be floated down to Oakland with barges and reduced to charging box sizes by cutting torches.

This somewhat dramatic marine episode illustrates the many industrial conquests that are being made daily by the oxy-acetylene cutting process.

There is always hope for the hopeless reclamation job when you have a snappy combination of a good man, good cutting torches and pure gas.

Remember Swank and the tanker.

AIR REDUCTION SALES COMPANY ACQUIRES THE GAS TANK RECHARGING COMPANY

On August 12, 1925 the Air Reduction Sales Company with executive offices at 342 Madison Avenue, New York City, purchased the assets and assumed the liabilities of the Gas Tank Recharging Company, incorporated in 1913. The Gas Tank Recharging Company owned and operated acetylene plants at Milwaukee, Wisconsin, and Bettendorf, Iowa; and a carbide plant at Keokuk, Iowa, where they manufactured Sun-Lite brand carbide. The manufacture and distribution of Airco-National Carbide will be increased by the acquisition of the Keokuk Plant guaranteeing to consumers in the Mid Western territories a carbide of high quality as maintained by National Carbide produced at the Ivanhoe Plant. The sales and service of the combined companies will be immediately available to every oxy-acetylene user.

It is reported that L. M. Zimmer has been appointed general sales manager of the Linde Air Products Company, New York, succeeding L. M. Moyer, who recently resigned as vice president in charge of Sales. Mr. Zimmer has been connected with the Linde organization for the past nine years.

Lincoln Electric Co., Cleveland, J. F. Lincoln, vice president, has appointed Whiteman & Brandt, Atlanta, Ga., its representative in that state. Clyde Equipment Co., Seattle, Wash., and Portland, Ore., has been appointed representative for Washington, Oregon and Idaho.

Reducing the Wreck to Charging Box Sizes

ON ADVERTISING

By Kut-off

Dear Editor:——

When I was working for Bill, I heard him remark that his work was the best way of advertising. He always claimed that a job well done always brought more work through the customer that was satisfied. And still he spent a good deal on form letters, circulars, and put a great many ads in the newspapers. But he was never satisfied that these were paying for themselves by bringing in work.

Now that I'm in business I've had a chance to wonder about it myself, and believe me, I've given it a lot of thought. After all, we welders have nothing to offer but our skill and experience. And no matter how many years we may have put in learning the game and getting so that we can doctor up a broken part, there are still a great many doubters and "wise Alecs" around who maintain,—and actually are ready to put up their mitts to prove—"that it can't be done." Sometimes, it gives me a pain in the neck to talk to an intelligent executive—probably a technically trained man—about a broken part that I could save for a paltry sum, and have him reply, "No, we'll wait for a new part no matter how long or how much it costs. We can't afford to take chances."

He's taking a lot of chances, isn't he? More like taking money out of the company's pocket and throwing it away.

Only recently the Chief Engineer of a large plant called me in to look at a measly little part I could have welded in about an hour and guaranteed with every certainty that it would be perfect, but he would not be convinced. And that particular casting was costing the company a good many hundreds each day as it was part of a machine that ran continuously day and night turning out a product which was in big demand at the time. A new part would take about a week to prepare and install. And his only reason for refusing to have it welded was that it might be brittle if it were preheated. Sometime or other he had read of the effect of repeated heatings and had become very much convinced that the preheating fire would hurt the casting. Funny, isn't it? Especially when you realize that he was supposed to be a graduate engineer. And I couldn't convince him that the preheating with the annealing afterward would make the casting better than a new one because I had noted that the design had certain features which introduced shrinkage strains in the part at the time of casting.

Naturally I tried to be very tactful in pointing this out to him and really only did it as a last resort. He agreed with me and even noted down my suggestions to be incorporated so that they would not suffer from this trouble again. But, as for that casting—nothing doing. I wondered why he had called me in, whether he simply wanted to waste my time or was testing my patience?

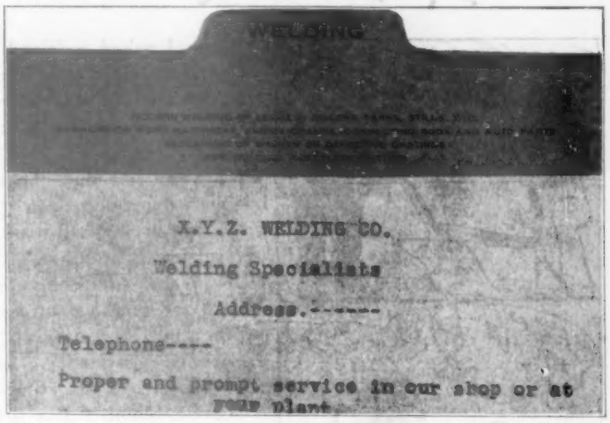
At any rate it convinced me of the fact that there are still a good many people awaiting a little education along welding lines, and the idea hit me that the place to begin would be at all schools and colleges where young men and boys are being trained for engineering careers or for any work connected with industrial pursuits.

It might be in the form of a lecture or lectures by someone well qualified by experience, or in the form of a short course that would not burden these students with their already lengthy weekly schedule of work. But to be of any value it must be accompanied by actual demonstration and test to show that the process is one to be considered as an efficient means to an end.

Regardless of whether any such knowledge would be absorbed, it is a certainty that it would make an impression so that at some future time if there were an opportunity to use the process, the individual concerned would not be handicapped by absolute ignorance of its value.

A little work along these lines would mean a great deal. Personally, I feel that the large apparatus manufacturers are the one's best equipped to handle this sort of propaganda, and they could easily devote a little time to this purpose to good advantage to themselves. At the same time they would be furthering the ends of the industry in general.

But that is not all that I intended to write you. As I haven't the organization as yet to send out a solicitor for work, I do most of it between jobs and at all odd times that I can devote to it. One of the things I discovered at an early time was



Good Form of Advertising for Welding Shops

the fact that a card of the kind used by most salesmen was practically valueless. It is easy enough to interest the Master Mechanic, or Engineer, or Purchasing Agent, but the card generally goes into the waste basket and then when a job does happen, there is a frantic search for "what was the name of that welding company?"

So I devised a card which just fit into a standard filing case, one of the kind you generally find on a Purchasing Agent's desk. It is the same size as the standard index cards used—3½x5 inches—and of a distinctive color to stand out from all the others. The tab on top is indexed "WELDING" and on the card are all the details pertaining to the process and the place where it is performed. Also I make a practice of penciling notations on it which may apply to this particular plant and which may interest the executive who will refer to the card.

It is almost a certainty that the majority of these cards have gone into the files where they belong and where they will be of service when wanted. In fact my account books show this by the increased business and the number of new names that have been added since I began to distribute these cards.

I am enclosing sample card for reproduction and trust that other job welders will be as successful with this stunt as I have been.

Yours for better welding,
Kut-off.

HEAVY DEMAND FOR ARC WELDERS

The Lincoln Electric Company, with home offices in Cleveland, reports through Mr. A. F. Davis, assistant to the general manager, that July has brought a heavy demand for electric motors and arc welders throughout the United States and also in the export fields.

A car load lot of the Lincoln "Linc-Weld" motors has been shipped from Cleveland to distributors in Los Angeles, California, and an order of equal size has just been filled for the Grand Rapids representatives of the Lincoln Electric Company. Another car load lot of motors is being prepared for shipment to the New York offices of the Cleveland house.

The progress being made with electric arc welding in the export fields is said to be illustrated by a large order which has just been filled by the Lincoln Electric Company from its Cleveland factories. Six large "Stable-Arc" welders have been sent to the Burmah Oil Company, at Burmah, India, for use in the oil fields and at the firm's refineries.

The funny side of Welding!

by C. Haensse.

When I asked a friend to suggest a name for my welding shop he thought hard for a few moments and answered, "Breakdown Welding Works." I instinctively felt that he was trying to kid me as it sounded like a reflection on my ability as a welder.

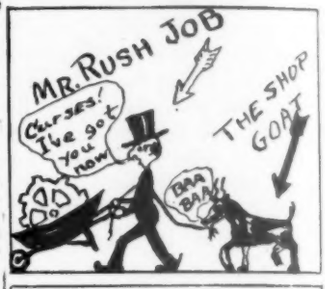
I always felt that the growth and success of the welding business depended on a good name. A bad name will kill a good dog or a good business; for example, "Arnot Coal Co.'" "Star View Restaurant," "Autogyp Battery Service," "Ketchum & Skinnem, Counselors at Law," "Skyrocket Airplane Co." etc. None of these succeeded.

The rush jobs used to "get my goat." I don't take them so seriously any more. In fact, I take them as a joke whenever possible. I am especially suspicious of the fellow who is "sweating blood." For instance, he will bring in a plow that the looks of the break shows has been broken for months, he wants it right away and will wait for it. You "go to it" sparing neither drills, files, saws or chisels. When the job is nearly done, he looks at his watch and says, "I'll come for it in the morning." When he calls for it a week later, you wake up to the fact that he was timing you and it was a cheap job he was really after.

A short time ago, a truck driver wanted me to fix "just a little crack" in an 8 cylinder auto block, admitting he had dropped it. He wanted me to cover his carelessness. I suspected that he thought it was just a little job and told him frankly it would cost $15.00 to preheat and weld it. Then he wanted me to camouflage it so it would not show. I told him to get some iron cement and do it himself as we did permanent work only.

It's usually a good policy to give a customer what he wants but not if his ignorance is going to steer you into a lot of trouble. For instance, one man wanted me to weld the universal joint that drove the magnet of his auto, explaining to me that the leather disc was a makeshift inserted to make ends meet. I had a tough time making him understand that the leather disc was necessary to make a fluxible joint and if welded solid and rigid it would not last five minutes.

Another time a man brought in a Ford inner clutch disc drum to be extracted. We removed it intact using an hour's time, gas, force and ingenuity and charged him two dollars. The joke was on us when we found ou that a new bushing costs only 35c, while we were laboring under the impression that he wanted to save the old one, because he wanted it extracted. We could have split the old one out with a cold chisel in less than two minutes.



HOW REUBEN SPEEDS 'EM UP!
BREAK DOWN WELDING WORKS
WE WELD WELL
THEM GUYS SURE KEEP US BUSY!
GET READY JOE! HERE THEY COME AGAIN!

When the same casting breaks a second time, we feel that our reputation is at stake and act accordingly. A short time ago a casting came back because the boy who ran the pr[illegible] overloaded it, and tampered with the safety stop. We rewelde[illegible] it with nickel-steel and reenforced it. When the machine was again overloaded the weld held, but something had to let go so it was the rest of the machine which was almost a total wreck. Because the weld did not break everybody was satisfied and the boy got a rest.

Once when we had a radiator guard which was bent, buckeled and twisted, clamped to the bending slab while the customer was watching while I was trying to study out the problem, the customer kept interrupting my thoughts by pointing out the bends and twists. Finally I said, "My friend finding those bends is the least of my trouble, but if you will tell me where to clamp, heat and hit this thing to get those bends out, I will thank you very much." Then the problem was all mine.

While we can weld, bend or straighten almost anything we are not mind readers, we cannot replace missing parts or bend parts back to their pre-war shape, from our imagination. In fact, things are brought in to be straightened that are not bent at all. For instance, headlight brackets, axles, etc., when in reality, bent fenders, springs and steering knuckles are the real cause of the trouble.

Only last month we got a crankcase to be welded. Several garage mechanics believed that the superficial blow-holes were the cause of the leakage. The leak was, in reality, caused by a broken gasket under the drain plug. To prevent friction and argument and save our customers' faces we welded the blow holes that did not need welding also put in a new gasket and everybody was satisfied and still sending us work.

There is an amusement park near our shop. One attraction was two autos weighing a ton, shooting down a steep track at the rate of 90 miles an hour, one passing under the other, while the latter is throwing a somersault in mid air, landing with a crash on a huge spring matress. We got a repair job after every act.

Finally, one of the disc wheels got bent and the manager wanted it welded and reenforced. My conscience had some misgivings about undertaking this job so I passed the buck of responsibility on the manager by telling him something like this, Mr. Fearless don't you think that by adding extra metal to one of your wheels it will alter the imponderable elements of the gyroscopic action of the wheel?" He assured me that it would make no difference.

Scientifically, it is a well known fact that rapidly revolving bodies take a definite position when free to move and it requires much force to change this dynamic or static balance or unballance whether it's a curve baseball or a 50 ton stabilizer on an ocean steamer.

Well, we welded and reenforced one of the wheels. That night the crowd got a thrill. The cars missed each other apparently by a hair. They landed on end partly sideways. No one was hurt. The manager said it was funny it never did that before.

ELECTRIC WELDING FOR BRIDGE REPAIRING

By A. C. Blackall

From Paris comes a most interesting account of repairs effected to a large bridge crossing the Seine, by means of electric welding. As will be seen from the following report, not only was the result entirely satisfactory, but the cost was comparatively infinitesimal.

The bridge in question, the Pont de Suresnes, is on the outskirts of Paris and is a main highway connecting the Bois de Boulogne and the commune of Suresnes. The bridge, built in 1874, comprises three cast-iron arches of 44, 52 and 44 meters in span. Five ribs are included in each arch, those on the exterior being of ornamental design, the interior ribs being plain and of considerably stronger construction.

During February, 1923, the end cast iron voussoir which rested upon the pier at the upstream side of the arch on the left bank of the river, was run into by a large lighter with a weight of some 300 tons, one-third of its weight when fully loaded. The impact broke off a portion of the voussoir, about 3 meters long by 40 cm. high. This caused several cracks, one of which extended, nearly vertically, throughout the remainder of the voussoir and also through the lower member of the spandrel.

To replace the damaged voussoir and the other damaged parts would have entailed the erection of centering, and the estimated cost was reckoned at several hundreds of thousands of francs. Apart from the cost, in consequence of the close proximity to the bridge of a lock and weir the idea of closing the damaged arch was quite unthinkable, since it would have entailed very serious interference to navigation.

A specialist in structural steel construction was called and finding that there was no way of replacing the voussoir without seriously impeding navigation, he suggested that the work of reparation be carried out in reinforced concrete. It was then decided to obtain advice from M. de Boulongne, Ingenieur-en-chef des Constructions Metalliques of the P. L. M. Railway, who was at that time engaged in strengthening La Voulte Viaduct in reinforced concrete.

After careful inspection, M. de Boulongne came to the conclusion that, however suitable the material might be for general strengthening operations, it was not suitable either technically or from an aesthetic point of view, for the repair of the local injury.

M. de Boulogne's long experience with electric welding on the Voulte Viaduct and at other places on the P. L. M. Railway suggested to him, however, a novel and at the same time a satisfactory and economical solution of the problem with which he was faced. His idea was to cast a new part for the voussoir as nearly identical as possible as the part broken out, and to weld it upon the remaining part of the voussoir, and then to weld up all the cracks in the voussoir and the spandrel, all the welds being made on the two faces of the voussoir, and the exterior face of the latter being ground to remove all trace of the welds.

As welding so carried out could not fully restore the original strength of the damaged members, the program provided for the addition of three strips of steel plate, 25 cm. wide, extending the whole length of the voussoir, one strip 20 cm. thick, upon the bottom flange, and the two others 30 cm. thick, spaced equally between the top and bottom flanges, with vertical distance pieces at frequent intervals. It was provided that the strips should be securely fixed and electrically welded at their ends upon the flanges of the voussoir joints, welded upon the voussoir itself on its whole length and kept in position one with another and with the voussoir by vertical strips welded to the longitudinal strips as well as to the voussoir.

There was a double object in the added strips of steel; they reinforce the voussoir in respect to resistance to direct compression acting in the direction of the axis of the arch rib, the effective resistance of the voussoir being increased by about 100 per cent; and they also reinforce the voussoir in respect to resistance to flexure due to the transverse forces to which this voussoir is particularly exposed, and by which the original damage was caused, the effective resistance of the voussoir to flexure being increased by nearly 200 per cent, without allowing anything for the effect of the vertical ribs added.

The increased strength provided for by this program was considered necessary as a precaution against future damage to the structure by lighters, which, owing to the position of

(*Continued on page 47*)

After the Quake—the Cutting Torch

How Service Men Got on the Job After the Santa Barbara Disaster and Assisted at Rescue Work and Reconstruction

WHEN old Mother Earth, tiring of the monotony of her perennial repose, occasionally stretches herself, she plays havoc with the pipes, steel girders, and machinery that man has confidently built, as the accompanying photographs of the destruction wrought by the Santa Barbara earthquake clearly show.

And that she is no respector of either persons or localities, in her shaking, is evident from the fact that during the past few months she has violently disturbed the peace of the people living in almost all parts of North America, including more recently many cities in Montana as well as Santa Barbara, Calif.

The unscrambling of earthquake confusion was at one time a well-nigh hopeless task, but, thanks to the development of efficient oxy-acetylene cutting torches, twisted steel and iron obstacles in the path of rescue and reconstruction work are now quickly cut away and removed and the work of saving life and property in such situations is thereby greatly facilitated.

After the Quake-the Cutting Torch~
Upper Right-Torch Cuts Reinforcing Bars so Shovels Can Get to Work. San Marcos Building
Center-Arlington Hotel. Torch Frees Concrete Slabs
Upper Left-Cutting Torch Paves the Way. $50,000 in Jewlry Recovered Near Here
Lower Right-San Marcos Building-Acetylene Tank Plays Imporant Role in Emergency
Lower Left-Providing Temporary Service by Bonding Terminal to Motor Generator Set

Immediately upon receipt of news of the Santa Barbara disaster, Mr. Chester Mott, manager of the California Compressed Gas Company and of the Purox Company's sales office at Los Angeles, accompanied by Mr. Roy Tadd of the Purox sales force, started for Santa Barbara with cutting outfits to assist in the rescue work. Mr. Mott's account of the Santa Barbara situation is given below. The pictures accompanying this article were taken by Mr. James W. McCartney of the Purox Company.

"On June 29th, at about 6:40 a. m. a series of earthquake shocks of secondary violence was felt pretty much along the entire Pacific Coast. These shocks were concentrated apparently over an area of about 10 miles wide by 60 miles long, and centralized very closely in Santa Barbara. The shocks were less violent than those in San Francisco in 1906. The primary disturbance consisted of three shocks, the second being considerably more severe than the first and the third considerably more severe than the second. These came within a few seconds of each other. As is usual in such cases, very faint shocks followed the first three blows at intervals of two or three hours but did no damage more than to jar down loose bricks which were hanging. The chief damage was done in Santa Barbara, and here the damage was largely confined to State Street, because the larger buildings are concentrated along State Street, the main thoroughfare.

"In the residential district, comparatively little damage was done, and I think no loss of life reported. The chimneys were in many cases shaken down and dishes thrown from the shelves. The hour at which the disturbance occurred was very fortunate from the standpoint of loss of life, for most people were at home and so few people were in the large buildings in the business district. Not only this, but families were together and much misery was averted in that it was not necessary for people to run about town attempting to find their relatives.

"The superintendent of the power plant opened the main line switch and thus killed all electric conductors, and the operator of the Southern Counties Gas Plant at Santa Barbara closed the main gas valve for the City and thus shut off all gas. The action on the part of these two men saved the City a great many lives and a tremendous loss of property.

"The Sheffield dam was destroyed and permitted a considerable quantity of water to flow through a small section of the City, but the main reservoir of the City water supply was not damaged.

"The property damage occurred in most cases to buildings which were of poor design or were constructed in a flimsy manner. Substantial buildings of structural steel or concrete which was properly made and reinforced stood the shocks almost without damage. Brick and stone buildings suffered severe damage.

"Something less than twenty people were killed in the entire disaster.

"News of the quake filtered into Los Angeles around noon. Telephone communications, of course, were severed. Rob Tadd and I started immediately for Santa Barbara with some cutting outfits, and found when we got there in the afternoon that two or three Purox cutting outfits were already in service, and that Oxygen and Acetylene from our warehouse were in use at various buildings where people were thought to be entombed. If you will look at pictures of the Arlington Hotel or the San Marcos building (this is where most of the people were killed), you will see the great difficulty involved in removing the debris without some means of cutting the reinforcing bars. This was the use to which torches were put. Also, in order to enable the workmen to proceed with any safety at all, it was necessary to cut down over-hanging slabs of concrete, brick, etc. In a great many cases, these were tied in by reinforcing bars, and it was necessary to cut these bars.

"Tadd and I stayed in Santa Barbara for 24 hours, instructing men in the use of the apparatus, and seeing that plenty of Oxygen and Acetylene from our warehouse was on hand at the various jobs. We carried Military passes and had entree to everything.

"The next day some additional outfits were sent up from Los Angeles, and more Oxygen and Acetylene was sent in.

"We acted under the direct orders of City Manager Nunn and City Engineer George D. Morrison.

"It will take millions to rebuild Santa Barbara, but apparently that money is forthcoming. The beautiful old Mission was badly damaged, and several private contributions amounting to $30,000 or $40,000 have been received for rebuilding. Women's Clubs throughout California are attempting to raise funds for this purpose. Also a great many church organizations are working to this same end.

"In a general way the plan for the rebuilding of Santa Barbara is to float a loan of some ten or fifteen million dollars, which will be parceled out up to 60% of the value of new buildings constructed. There is also a subscription fund of two million dollars being raised to take care of individuals, home owners and residents of Santa Barbara until some semblance of normal business is restored. The attempt is being made to raise all of these funds in California.

"Probably one of the most severe losses is that due to total cessation of business. State Street has only just now been re-opened to the public, and merchants are just getting back into their establishments to salvage their stocks or start up in business again.

"We are told that a very large new Hotel is going to be built down near the ocean front, and one hears nothing but determined expressions of intention to rebuild this beautiful City. There is no question but that buildings properly constructed would withstand many such shocks as were experienced there, and it is believed that very strict ordinances governing future building plans will be drawn and enforced."

Chester Mott

ELECTRIC ARC FOR BRIDGE REPAIR

(*Continued from page 45*)

a floating pier used by river steamers and to other obstacles in the vicinity of the river lock are compelled to pass close to the repaired voussoir of the bridge. At times, when the water level of the river is high, the superstructure of a lighter is very apt to collide with the voussoir at the upstream springing, and it is then a question whether the lighter or the bridge will suffer injury.

In the collision of 1923, the bridge had much the worst of the encounter, whereas in a similar mishap which occurred in the first half of 1924 the repaired voussoir was not appreciably damaged, while the superstructure of the lighter was entirely demolished. In consequence of this second collision it was decided to change the position of the steamboat pier and other obstacles, and also to further strengthen the voussoir by the addition of transverse braces between the exterior rib and two of the inner ribs, thus providing for the distribution of shocks due to any collision in the future.

This method of repair carried out in accordance with the scheme of M. de Boulogne has proved in every way satisfactory, and its economy may be judged by the fact that the total cost was not more than 50,000 francs. Moreover, it had the advantage of causing no disfigurement to the bridge, no trace of the repair work being perceptible on the exterior face of the voussoir.

News of the Welding Trade

It is reported that the Spokane Oxy-Acetylene Welding Company, 2023 Maxwell Ave., Spokane, Washington, is planning to build a one story addition.

The International Oxygen Company, Newark, N. J., is paying its semi-annual 3% dividend on July 30th on all the outstanding stock of the company.

Keith Dunham Company of Chicago, Illinois, report the installation of a double capacity Oxeco oxygen producing unit at Pitcairn, Penna., and also the installation of an Oxeco oxygen producing plant for the Burdett Oxygen Company, Chicago, Illinois.

J. C. Dawes, formerly with the Weldcraft Company, Pittsburgh, Pa., has been appointed a sales representative at the Pittsburgh branch of the International Oxygen Company, Newark, N. J. L. W. McCullough has been appointed sales representative for the branch at Toledo.

C. N. Shaffner, formerly northeastern sales manager of the Taylor Wharton Iron and Steel Company, Highbridge, N. J., and Wm. Wharton, Jr. & Co., Easton, Penna., is now in charge of a commission office representing these companies in New York City in partnership with W. H. Allen who was formerly connected with the sales organization of these companies. Shaffner and Allen with offices at 50 Church Street, New York City, will handle the northern and eastern territory for several other companies.

J. G. Stell, 5621 Kirkwood St., Pittsburgh, Penna., is planning to build an addition to his automobile repair shop and garage to provide facilities for brazing and welding.

A. A. Heller, treasurer and general manager, International Oxygen Company, Newark, N. J., has returned from an extensive trip abroad.

It is reported that the Union Carbide Company is planning a one story addition to its plant at Niagara Falls to cost approximately $35,000 with equipment.

A new plant is soon to be built by the Model Welding Company, Indianapolis, Indiana, at 622 East Washington Street.

Classified Ads

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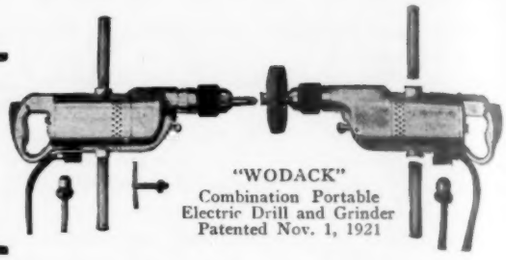

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CURRENT WELDING LITERATURE

COLLAPSIBLE RIMS MANUFACTURED BY OXY-ACETYLENE PROCESS.—In the manufacture of collapsible rims for automobile tires the cutting torch is used to prepare the parts and the welding torch for welding hinges to the rims. There are 81 inches of welding in each rim.—The Welding Journal, London, June.

STANDARDIZATION IN WELDING.—A report of the technical session held at the recent annual meeting of the American Welding Society.—The Welding Journal, London, June.

WELDING COURSES AT MILWAUKEE VOCATIONAL SCHOOL, by J. H. Hess.—Description of the lecture work and shop work available to welding students and those who wish to study welding in the Milwaukee district.—Acetylene Journal, July.

METAL WELDING PROCESS IMPORTANT STEP IN AUTO PRODUCTION.—How, when and where the oxy-acetylene blowpipe assists the manufacturer to make stronger, or repair cheaper, cars, trucks or tractors. A description of the importance of the importance of the welding torch in the fabrication of all classes of motor vehicles.—Automotive Manufacturer, June.

EXTRACTS FROM A. S. M. E. BOILER CONSTRUCTION CODE—Reprint of that portion of the new boiler code of the A. S. M. E. which deals with the welding operations and the construction of unfired pressure vessels.—Journal of the A. W. S., June.

SMALL WELDING OUTFIT FOR BONDING ALSO MAKES STRONG AIR LINE JOINTS.—The electric welding machine which is used for bonding on the track work in many miner can also be used for a great variety of repair and construction jobs if the welder is fully informed on the possibilities of the process.—Coal Age, July 2nd.

THE HANSEN ARC WELDER.—A circular published by the Northwestern Manufacturing Company, Milwaukee, Wisconsin, describing a new line of arc welding generators. The outstanding feature of the new welder is the special device of the commutator pole winding so as to make it function both as a commutating winding and stabilizing winding, thus disposing of the need for external stabilizing devices.

OLD MATERIAL USEFULLY EMPLOYED BY EAST OHIO GAS COMPANY, by L. E. Smith.—Any number of things can be made from surplus and wornout material on a lease as many operators have found merely by the exercise of ingenuity and the use of a welding outfit.—National Petroleum News, July 1st.

THE EFFICIENCY OF THE TODD TWIN POLE ARC WELDER.—A circular published by the Todd Twin Pole Arc Welders, New York City, describing and illustrating the Todd line of electric arc welding machinery.

BEHIND THE SAFETY GOGGLES STANDS WELLSWORTH.—A 16-page booklet prepared by the American Optical Company, New York City, describing the factory practice in the manufacture and testing of goggles made by the American Optical Company in their plant at Southbridge, Mass. The principles governing the manufacture of goggles and shields for welders are explained in detail.

DETERMINING AND INCREASING THE SKILL OF WELDERS, by G. O. Carter.—Many welders are doing poor work without realizing it and, therefore, it is necessary to make an actual test of the welder's skill in order to qualify him for work which must be carefully done. Test pieces will show whether the welder deposits sound metal. He should be able to do this when being observed by the inspector. He must also secure good fusion with parent metal and make this fusion penetrate to the bottom of the weld. Many welders can be made to improve their work by careful coaching.—Acetylene Journal, August.

METHODS AND PROCEDURE FOR WELDING STEEL.—Lecture on the field for steel welding and workroom exercises on vertical welding ¼-inch beveled steel bars and welding ⅝-inch steel bars for tensile test.—Acetylene Journal, August.

LINCOLN STABLE-ARC WELDERS.—24-page bulletin issued by the Lincoln Electric Company of Cleveland. Describes the arc welding process and shows the difference between carbon electrode and metal electrode welding. Points out the distinguishing features of the Stable-arc welder. Illustrations and descriptions of the different models of Lincoln arc welding equipment, also list of the industries in which they are used.

BOILER REPAIRS BY WELDING PROCESSES.—A digest of a paper read by M. L. Cauchois before the 8th International Congress of Acetylene and Autogenous Welding. The paper discusses the principal factors relating to the material used in steam boilers, the characteristics and strength and welds made on boilers, the most probable defects of the welds and how they can be disclosed and the qualifications of a boiler welder.—The Welding Journal, London, July.

TESTS FOR WELDS.—A new kind of test described by Prof. C. F. Keel of the Swiss Acetylene and Welding Association. The value of tensile and elongation tests is described. Bending and etching tests are recommended as easy to make in the welding shop. It is recommended that as many different kinds of tests be made as possible.—The Welding Journal, London, July.

HEAVY CUTTING IN THE STEEL FOUNDRY.—Oxy-acetylene cutting is so simple and so far ahead of all other methods that it is accepted in the foundry as normal practice. Portability of the apparatus makes it possible to do the work anywhere. Oxy-acetylene cutting removes all limitations from the matter of gating and heading up castings. Much machining is also eliminated. In large foundries the operations are arranged so that the cutter can work as long as possible on jobs of the same size.—Industrial Gases, London, June.

THE OXYGEN DIGEST.—Bulletin published by members of the Gas Products Association. The current issue contains a description of a repair job on a large aluminum steam jacketed kettle; a discussion of the factors necessary for the production of sound welds; a list of production welding jobs which a job welder found to do to keep his shop busy when repair work was slack; a description of a test on bronze welded cast iron pipe; and an account of the uses of the acetylene torch in a shoe factory.

PERMANENT TRACK FEATURES REHABILITATION IN WISCONSIN CITIES, by A. A. Oldfield.—More than a quarter of a million dollars being expended for way and structure rehabilitation during three year program. Concrete foundation, resilient ties, welded joints and manganese special work used to insure permanent construction.—Electric Railway Journal, August 1st.

SUPERFICIAL CHANGES IN METALS AND INDUSTRIAL ALLOYS.—A group of micro photographs showing how the surface structure of different metals undergoes a certain amount of change in the course of mechanical treatment and heat treatment. While these changes are not very great they are nevertheless bound to have important effects when the metals are used for different kinds of fabrication.—Revue de la Soudure Autogene, June, 1925.

JOURNAL OF THE AMERICAN WELDING SOCIETY.—The July number contains the following articles: Specifications of Rail Joint Welders, by R. B. Fehr; Inspection of Work and Checking Skill of Operators in Rail Joint Welding, by A. P. Way; Selection of Qualified Welders by Herman Ullmer; Bronze Welding for Locomotive Frames, by J. H. Chancey; Welding With Tobin Bronze, by W. C. Swift; Welding of Ornamental Iron, by R. Weimer; Job Welding of Aluminum, by D. H. Miller; The Rationale of Safe Welded Unfired Pressure Vessels, by S. W. Miller; Gas Welding Instructions to Apprentices in Welding Sheet Metal, by Jos. W. Meadowcroft; The Thermit Weld for Marine Repairs, by W. M. Kennedy.

REPAIRING LOCOMOTIVE FRAMES BY ARC WELDING, by James M. Vossler.—Melting filler rod to form correct bead. Necessity of cleaning work. Preparing frame for welding. Use of the double vee bevel. Laying beads in line with the strain.—American Machinist, July 23.

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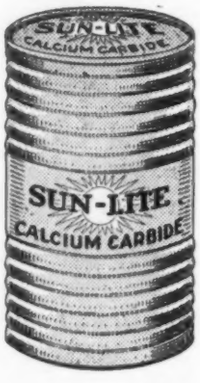

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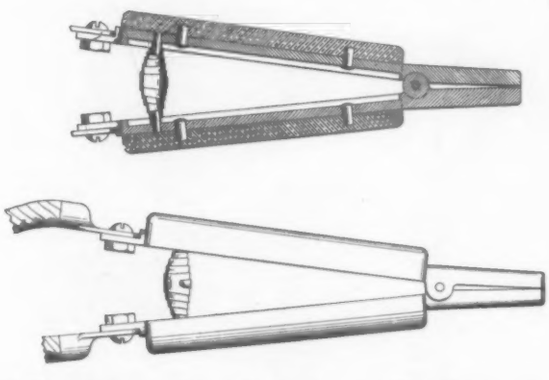

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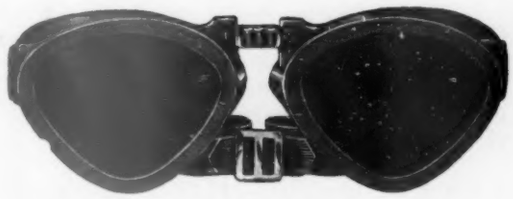

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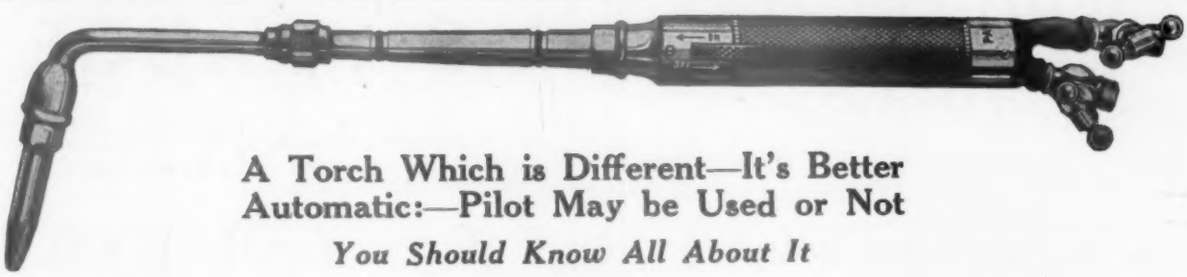

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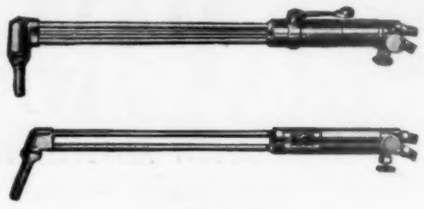

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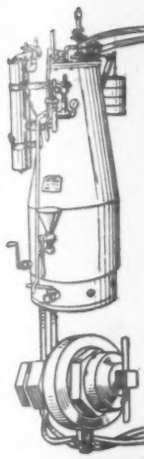

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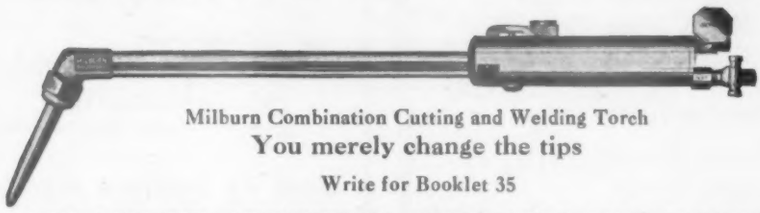

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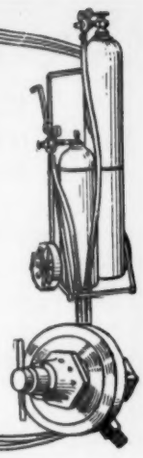

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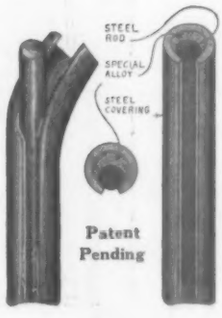

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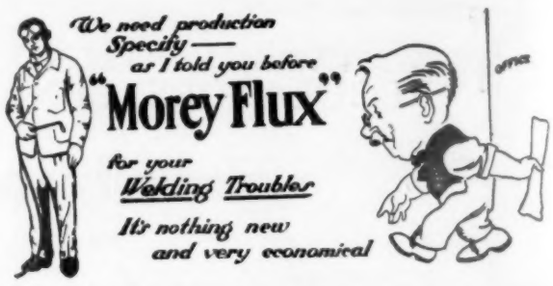

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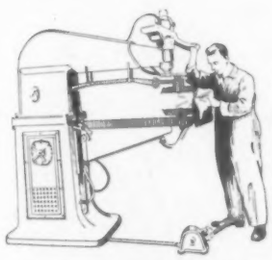

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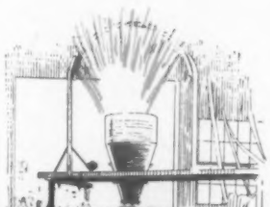

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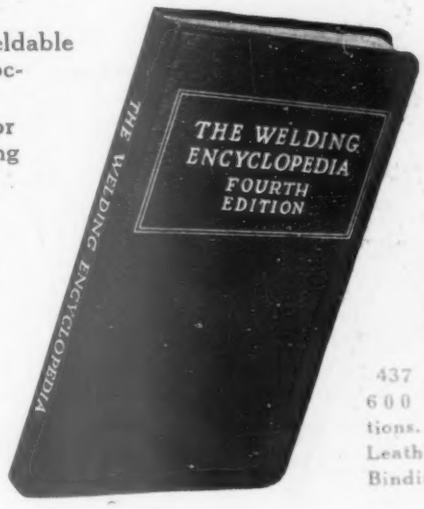

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